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The Chief Engineer of the Texas Railroad Commission writes an exceedingly interesting letter, which we print this week. He says, in effect, that railroad building in Texas is at a standstill; that people ought to build railroads there but do not; that they are afraid of the commission but ought not to be. It looks very much as if the burden of proof had somehow got shifted from the railroads to the commission and the state legislature!

The New York State Public Service Commission for the Second district has promptly vetoed the railroads' rule requiring a shipment of a thousand of brick to have the consignee's name and address marked on them 1,000 times, and has intimated that the rule will be disapproved as regards any and all commodities which are of such a nature that it would be a hardship on the shipper to require the full address of the consignee to be shown on every piece or package. Such a requirement is, indeed, a hardship on the shipper in many cases. On the other hand it comes pretty near being a hardship on the carrier to require him to hunt up lost freight which bears no marks by which it can be identified. Are we to require perfect service in the freight houses? Can a railroad be expected, reasonably, never to lose or missend anything? If it can—if perfection must be the regular thing—should there not be additional compensation? The shipper of 1,000 bags of salt not marked ought to pay more than the one who sends a similar lot fully marked.

In our issue of June 18, *Daily Edition*, the statement, "The damage to cars in yards has become so great that the Pennsylvania Railroad has issued orders that the speed in switching should not exceed two miles an hour" may have been misleading. The reference was to Rule No. 4 regarding the handling of freight cars in yards, which is: "Speed at impact between cars must not exceed two miles per hour. In classifying, cars must be ridden home when necessary to obtain this result." The inference from our editorial statement is that the speed in all yard switching be kept down to two miles per hour, while the statement should have been that all switching speeds be such that cars in meeting shall not cause a greater impact than that due to a speed of two miles per hour.

Judge C. C. Kohlsaat, in the opinion rendered by him in the United States Circuit Court at Chicago on July 15, in enjoining the Chicago, Indianapolis & Louisville from carrying out its contract to exchange transportation for a cash equivalent in advertising in *Munsey's Magazine*, held, broadly, that such exchange, under the amended Interstate Commerce Act, is illegal. The opinion is printed on another page. The Act, as amended in 1906, prohibits any carrier from receiving "a greater, or less, or different compensation" for transportation than the charges specified in the tariffs filed by it. Judge Kohlsaat held that the law was violated by a carrier receiving advertising for transportation, because this is a "different" compensation from that specified in its tariffs—this, despite the fact that the Monon filed the contract in question with the Interstate Commerce Commission. He held that the exchange might involve the receipt of a "less" compensation, because advertising has no fixed value. Counsel for the Monon contended that the law did not and could not deprive the carrier of the right of barter; but the court held that Congress, acting in the interest of the public to prevent unfair discrimination, could, and did, deprive railroads of this right. It will be interesting to see whether the Supreme Court of the United States will uphold a decision thus abridging railroads' freedom of contract. The opinion seems to condemn not only contracts for the straight exchange of transportation for advertising, but also those providing for the settlement of balances in cash. If the railroad may not barter for all of its advertising, it is not likely that it may barter for part of it. Probably on grounds of expediency a majority of railroad managements will not regret if the decision of the lower court is upheld by the Supreme Court. A decision vindicating the legality of exchanging transportation for advertising would subject the carriers to importunities by publishers, especially of small country newspapers, from which they have had welcome relief since the ruling of the Interstate Commerce Commission on the subject almost two years ago, and might give rise to abuses from which the railroad business now is happily free.

THE GROWTH OF TRAFFIC.

The abstract of the annual report of the Interstate Commerce Commission on the statistics of the railroads of the United States for the year ending with June, 1907, issued last week, enables us to review the growth of traffic in this country for another year for the culminating year of an industrial progress which has never had its equal before in a territory of such extent. As this phenomenal growth goes far to explain the condition of industry at the present time, and of the

transportation industry particularly, the facts shown herewith deserve to be pondered.

Let us premise then, that in the year ending with June, 1889, a fairly prosperous year, the work done by the railroads of the country amounted to 68,677 millions of ton-miles and 11,964 millions of passenger-miles. The passenger traffic grew 25 per cent. and the freight traffic 32 per cent. in the next four years, followed in 1893-94 by a sudden and important reduction in traffic, amounting in the first year to 9 per cent. in passengers and more than 9 per cent. in freight. Passenger traffic hardly grew at all until 1898, freight traffic more rapidly, and the comparison of the first nine of the 18 years since 1888-89 stands as follows:

Millions of :	1888-9	1897-8.	Increase.	Per cent.
Passenger miles	11,964	13,672	1,708	14.4
Ton-miles	68,677	114,077	45,400	66.1

This is an average growth of less than 1.2 per cent. per year in passenger traffic, and of about 5½ per cent. in freight traffic. Then there comes the nine years ending with June, 1907, in which the growth was as follows:

Millions of :	1897-8.	1906-7.	Increase.	Per cent.
Passenger miles	13,672	27,719	14,047	102.7
Ton-miles	114,077	236,601	122,524	107.4

Particular attention is invited to this last comparison, which shows that in these nine years both passenger and freight traffic *more than doubled.*

We showed in 1898 (page 338 of the *Railroad Gazette*), that the freight traffic of all Europe in the last year reported was less than 102,000 millions of ton-miles, and here we have a growth within nine years exceeding that amount. Is it strange that with an average yearly growth of less than 1¼ per cent. in passengers and 6 per cent. in freight in the nine years to 1898, the railroads should be overwhelmed by a yearly growth of 8 per cent. in passengers and 8½ per cent. in freight in the next nine years? And is it strange that a country which had pushed its production so as to more than double its shipments in nine years should find that it had been doing too much—had multiplied the instruments of production beyond the immediate demand for their products, as shown by a decrease of 14 per cent. in railroad gross earnings in the first four months of this year? And is it strange that with such an overwhelming growth of traffic continued for so many years, many of the principal railroads should have engaged in great extensions of their facilities for transportation, which, now that the rapid growth has been interrupted, are in excess of present requirements, and tax the ability of the companies to secure new capital? The rapidity of the growth of the traffic was matched only by the suddenness of its interruption. The increase in freight in the year to June 30, 1907, was greater than in any other year except that in the year next preceding, and in passenger traffic the increase was without any precedent. The fall has been from the highest summit ever attained, which makes it seem the greater. To one who reflects on such subjects it was long ago manifest that the rapid rate of growth in production and traffic could not possibly be maintained permanently, and yet that a great and sudden check must prove disastrous to many interests. These are facts which have been urged in these columns in discussing the growth of the traffic in previous years. A year ago in reviewing the traffic of 1905-06 we said: "Of course, this is a rate of growth which cannot be maintained," and again: "The programs for tremendous increases in facilities made by a very large number of companies two years or less ago, if they could have been executed in the shortest possible time, as was intended in many cases, would most probably have exceeded the requirements of traffic."

A little more than a year ago there were loud and indignant complaints that the railroads were not prepared to carry the freight offered them. Since then a chief use of many of the new yards and sidings has been to hold the superfluous rolling stock. Some changes of the kind are inevitable in a country whose resources are undergoing development. That the changes may be less sudden and great depends more upon those engaged in extending industries than upon the carriers.

DRAFT RIGGING.

When the old hook and chain coupling was found to cause severe shocks to the cars connected by it, due to buffing, and an attempt was made to modify the severity of this shock by the introduction of springs to cushion the blow, the results were fairly satisfactory upon the light cars to which they were first applied. But as the weights of cars were increased and the severity of the buffing blows was intensified, the difference between what was accomplished and what was desired became more marked and there has been a long line of modifications, attempted and accomplished, in the endeavor to relieve the car of a portion of the shock to which it is subjected in switching and road service. D. L. Barnes, in a paper before the New York Railroad, was among the first, if not the very first, to call attention to the comparatively small percentage of the force of the blow that was absorbed by the spring of the draft gear. Since then improvements have been made and the Master Car Builders' test of 1902 showed what had been accomplished and indicated the lines that future work should follow. But even with the best that has been done, there is still a great uncompensated increment of the blow that must be sustained directly by the car.

In discussing the matter before the Pittsburgh Railway Club in December, Mr. A. Stucki tabulated the results and showed that a loaded car of 100,000 lbs. capacity, when moving at eight miles per hour and striking a similar car standing, delivered a blow of which but 23.2 per cent. of its intensity was absorbed by the draft gear of the most efficient type, while 7.5 per cent. was absorbed by the ordinary spring gear, and that these percentages dropped to 3.7 and 1.2 respectively when the speed was raised to 20 miles an hour. And, further, that when the blow was received by an unyielding obstacle, such as a bumping post, the gears could absorb 5.8 and 1.9 per cent. of the blow delivered at eight miles an hour, and but .92 and .30 per cent. at 20 miles an hour.

"This shows that even at the slower speed, and even under the assumption that both of the meeting gears are alike, most of the blow is taken by the car directly."

Of course, it is not expected or contemplated that cars will be brought together at 20 miles an hour or even that eight miles will be common practice, but the thing will happen, and when it does, other things will happen also. What these things are, are not told by tests made with a drop, and few roads or car owners care to conduct a series of collision tests in order to ascertain from actual experience just what will happen under these conditions. We simply know that the capacity of the gear having been defined by the drop test, and the intensity of the blow delivered by the car having been determined by calculation, the difference between the two must be cared for by the car body. But how is this to be done, and what is to be the effect?

As already stated, car owners are naturally somewhat averse to collision tests, as tending to be destructive of personal property, but a few have been made, and were the details available for publication, they would be mighty interesting reading and might stir up some superintendents to insist upon more care being exercised in the yards. It would be a story of the destruction of property that has its parallel in yard work every day without the data regarding speeds and weight that make for a comparison showing the relationship existing between cause and effect, with the value attending it.

Mr. Stucki's paper, to which reference has been made, deals with the types of friction gear that sustained the framing of the car, even as they were when springs were unused, as in the case of the old four-wheeled jimmies of the early anthracite traffic. And that the cars may be able to sustain these

blows and stresses they must be designed accordingly and the underframing so strengthened that it can meet requirements, that like many other things developed in later day railroading, were undreamed of in the days of the 10-ton car and the link and pin coupling.

The latest consideration of the matter was presented by R. P. C. Sanderson before the New York Railroad Club in April in a paper in which he called attention to the insufficiency of the ordinary tests that are made on couplers and draft rigging; insufficient because they do not even remotely reproduce the yard conditions of buffing to which cars are subjected. As a substitute for the usual test, Mr. Sanderson suggests the use of a drop weighing 9,000 lbs. falling through heights varying from 6 in. to 18 in. The slower movement and heavier weight comes more closely to actual car movement than the lighter drops, though it is acknowledged that actual conditions are not reproduced because of the necessarily unyielding anvil, whereas, in the case of two cars coming together, the car that is struck moves almost instantly, thus greatly softening the blow and relieving the draft rigging to a corresponding extent from the severity of the stress to which it would otherwise be subjected.

As for the rate of resistance to be offered in a design, as far as the static or pressure diagram is concerned, it was urged that that most to be desired was "one having a fairly easy movement at the first part of the stroke and then as rapid an increase of work done as it is possible to get without too much rigidity up to the maximum capacity. This to continue to the end of the stroke, thus giving the largest area to the diagram, representing the greatest amount of work done in a given time. There should be no sudden jumps in this line, as they will have the effect of successive shocks when the movement is made rapidly." The reason for this is that, when the train is on the road the individual cars are subjected to a constant series of light blows of compression and tension on the draft gear. If the latter is stiff these blows are not absorbed or cushioned and the effect is the same as though they were delivered directly against the frame, and the relieving of these light stresses becomes a matter of importance in handling a train in safety. But, when the heavier buffing blows are delivered, it becomes necessary that there should be a rapid rise in the resistance of the gear in order to protect the car. This leads to the friction gear and upon the designing of this the doctors are in disagreement. The point of disagreement lies in the finish. It is claimed that it is impossible to procure the desired accuracy of action with the parts left rough, as they come from the foundry and the forge and that careful finishing is essential; it is also claimed that finish is unnecessary and that perfect reliability can be obtained with rough forgings and castings.

But with all the resistance that can be obtained, the travel of the drawhead is too short to permit of absorbing the whole blow of two colliding cars when loaded and moving at the speeds obtaining in every day switching service. The best that can be done is to accomplish a modification of its severity, and leave the balance to be taken up by the frames. And here we again find two camps: those who propose a buffer block and those who consider it useless and in the way, and who think that if the draft gear is set on a line approximately in accord with the center sills and is made strong enough to withstand the heavy buffing blows, the blocks had best not be used.

It is suggested that it is quite possible that these disagreements and conflicting opinions regarding the proper methods to be pursued are due not so much to a conflict of conditions as to a conflict of observations. Conditions have been changing so rapidly that certain lines have not kept pace with the demands. For example, it is not at all probable that the present contour lines and dimensions of the M. C. B. coupler would have been adopted as they are, had the car of 100,000 lbs. capacity been a reality at the time. The introduction of this car has, therefore, introduced an element into railroad practice that was not originally provided for and that has greatly aggravated the already complicated problem that existed at the time Mr. Barnes read his paper. The question then arises whether it will be cheaper, in the long run, for the railroads to work on independently by a system of trial and error, depending upon a multiplicity of observers, working under widely varying conditions and reaching as widely varying conclusions, or to take the matter up scientifically and systematically and make an investigation that will involve the immediate destruction of much property, and an expense of several thousand dollars, and reach some definite result the soundness of which is demonstrable. Such work is undertaken in other branches of engineering. Bridge builders do not hesitate to break full size sections and expensive models in order to obtain data upon which future computations may be based why should the same principles of action not be applied to car couplers, if the present methods of testing are not perfectly satisfactory?

FREIGHT RATES TOO LOW BEFORE THE PANIC.

If the railroads were suffering only along with, and as much as, other industries from the business depression, there would be no justice in their proposal to raise freight rates. They might then be fairly charged, as they have been unfairly charged, with "playing baby." If their situation was like that of other concerns they should pocket their losses without whining. But this is not the case. Prices of most commodities were plenty high enough when the panic came last fall. Many of them were too high. Largely because prices and wages had been and still were so high, freight rates had become too low. If there had been no panic, followed by depression, the need for a raise in freight rates would have been as imperative as it is now. To do justice to the present and the future, it is necessary to recall the recent past.

Economics distinguish between the nominal and the real wages of labor. When the worker gets a raise of 10 per cent. in his pay, and the prices of the things he has to buy are increased 20 per cent., his real wages are reduced. Likewise, if the price of wheat rises, but the cost of growing it goes up still more, because the price of land or wages of farm labor have gone up, the farmer is hurt, not benefited. The railroads before the panic were even worse off than the wage-earner or the farmer in these illustrations. While the prices they got for transportation had not risen, the prices of almost everything that they had to buy advanced, in many cases very greatly. It is easy to pick out specific rates that have been advanced within recent years; but the average rate per ton per mile of 7.48 mills the fiscal year in 1906, was lower than the rate per ton per mile in any previous year except 1899 and 1900. "The increase in the amount of manufactures (carried) was so much greater than any of the other classes that it is the only class whose per cent. of the total rose markedly," said the statistician of the Interstate Commerce Commission on page 79 of the "Statistics of Railways in the United States," for the fiscal year 1906. So the low average freight rate in 1906 cannot be attributed to a disproportionate increase of commerce in bulky commodities hauled at low rates. The low average charge was made up of low charges on almost all kinds and classes of goods.

The results of keeping the prices of transportation low while the prices of all other services and commodities were high and rising are shown by annual reports. It is assumed by most people who argue against higher freight rates that the railroads were as prosperous, proportionately, as other concerns until the panic came. This is not true. The annual reports of numerous roads show that as early as the fiscal year ended June 30, 1907, their gross earnings were largely increasing, while their net earnings were falling off. Among the roads whose net earnings were less in the fiscal year

1907 than in the fiscal year 1906, by amounts varying from $10,000 to $2,000,000, were the Chicago, Milwaukee & St. Paul; Central of Georgia; Great Northern; Minneapolis, St. Paul & Sault Ste. Marie; Hocking Valley; Chicago, St. Paul, Minneapolis & Omaha; Chicago, Indianapolis & Louisville; Chesapeake & Ohio; New York, New Haven & Hartford; Nashville, Chattanooga & St. Louis; Chicago Great Western; Atlantic Coast Line, and Seaboard Air Line. The Pennsylvania Railroad and the New York Central showed declines in net earnings in the calendar year 1907. Even on most roads whose net earnings were still growing in 1907 the increase in expenses was greater—in most cases far greater—than the increase in net earnings. Of course, the operating accounts on some roads probably included expenditures for betterments; but in a general way they truly reflected conditions. Long before other businesses ceased to be highly prosperous the railroads had started down hill. They were tobogganing at a rapid rate between the end of June and the end of October, 1907. The panic did not start them down hill, but only shoved them along faster.

The great increase in operating expenses that reduced net earnings on many roads was accompanied by a heavy increase in fixed charges and stock obligations. Prosperity swamped the roads with traffic. To handle it they had to make many betterments and extensions. To make these betterments and extensions they had to pay the high prices for labor and materials that were current. The investment represented by second track, sidings, bridges, stations, new lines, cars, locomotives, etc., that are built or bought under such conditions is much bigger than the investment that they represent if built when labor and materials are cheap; and the amount that must be derived from the business handled must be larger proportionately. A given bridge that is built with the proceeds from 4 per cent. bonds and that costs $500,000, has got to earn $20,000 net per year to pay interest on the investment. If higher wages and prices of materials make the same bridge cost $1,000,000, it has got to earn $40,000 per year net to pay interest on the investment. There is no direct relation between rates and the valuation or capitalization of any railroad or any particular part of any railroad. But the rates of railroads in general must be such that the total earnings will pay all expenses and a profit on the investment, or people will quit building and improving railroads. The costly extensions and improvements that the roads made when labor and materials were high represent, and will represent as long as they exist, an enormous investment on which they must pay fixed charges and dividends. They can only pay them out of earnings. If earnings were too small in good times, when traffic was heavy, and are still too small in bad times, when traffic is light, it seems to follow that to enable the roads to meet their reasonable obligations, rates have got to go up, unless in some way operating expenses can be reduced more than they have been on most lines. Many roads seem to have got operating expenses under remarkably good control. But it is to be feared that in most instances they have done so by means that will work no permanent good to the properties.

Railroad officials may have been undiplomatic in trying to raise rates in hard times. They may have made a strategic mistake in proposing to make a general advance. But that either wages of labor must be reduced and the prices of materials must come down a great deal more than they have, or rates must go up, seems certain. The latter alternative is greatly preferable. Railroad transportation in the United States is probably the cheapest service in the world; it is probably cheaper, proportionately, than any commodity sold in the world. To bring the rates of transportation into something like the same relation to other prices and values that they bore before the great advances in the general level of wages and prices within the last few years would be but justice to the investors in railroad properties. What is more important, this must be done, and done soon, to prevent stagnation of railroad enterprise. If shippers and commissions shortsightedly prevent reasonable advances in rates now or in the very near future, and politicians and walking delegates prevent reasonable reductions in wages, the ultimate, indirect loss to wage earners and to commerce and industry is certain to be far greater than the direct gain. A high scale of wages does not benefit working men who have no jobs. A low scale of freight rates does not benefit farmers or manufacturers who cannot get cars in which to ship their products.

NEW PUBLICATIONS.

Handbook of Mathematics for Engineers. By L. A. Waterbury, C.E. New York: John Wiley & Sons. 91 pages; 2¾ x 5½ in.; flexible covers. Price, $1.00.

The book consists of a collection of mathematical formulae on algebra, trigonometry, analytical geometry, differential and integral calculus, theoretical mechanics and the mechanics of materials. No attempt is made to prove the work as the book is intended for reference and not as a text book. It deals exclusively in what are generally known as the higher mathematics. Some of the work will be of value occasionally to the practicing engineer though generally it will be of greater use to the student.

Railway Signaling. By a Staff of Expert Signal Engineers. Pittsburgh, Pa.: Published by *The Electric Journal*, 424 Sixth avenue. Cloth; 108 pages; 6¼x9¼ in.

This book is a reprint of eight articles which have been published in the monthly periodical above named. They deal with mechanical, electro pneumatic and "all-electric" interlocking, the electric train staff and automatic block signaling, the last named subject being divided into four chapters; general, direct-current, alternating-current and alternating-current, double-rail return. The authors, T. G. Willson, W. H. Cadwallader, J. D. Taylor, T. H. Patenall, W. E. Foster and J. B. Struble are all engineers in the employ of the Union Switch & Signal Company, and all thoroughly familiar with their respective subjects.

American Street Railway Investments. The Electric Traction "Red Book." Issued annually in connection with the *Electric Railway Journal*. 500 pages, 9 x 13 in. Published at 239 West 39th St., New York. Edition of 1908; cloth. Price, $5.00.

The 1908 edition of the Street Railway Red Book comes to us in the same form as in previous years, although slightly enlarged, principally by the addition of several maps hitherto unpublished. An interesting feature of this publication is the classification in the preface of the street railways of the country in groups; the first group including lines having gross receipts of over $1,000,000 for 1907; the second group including companies having receipts between $500,000 and $1,000,000; the third, lines between $100,000 and $500,000; the fourth, between $50,000 and $100,000, and the fifth, between $25,000 and $50,000. The present compilation shows 78 companies included in the first group as against 68 in 1906, although a few of these additions are due to the changes in the method of reporting. The number of companies having gross earnings of over $10,000,000 is given as 12 for 1907 and as six for 1906. In three of these 12 instances the change is made by the fact that the list was incomplete last year, but in three other instances, lines formerly in the $9,000,000 class have risen to the $10,000,000 class. The Interborough Rapid Transit Company heads the list of all the companies, arranged in order of gross earnings; then follow the Brooklyn Rapid Transit Company and the Philadelphia Company of Pittsburgh. Twenty-one companies are reported as having gross earnings of $5,000,000 or more in 1907 as against 17 companies in 1906, but with one exception these changes are all due to the form of the list. The number of companies having gross earnings between $500,000 and $1,000,000 is set down as 45 in 1907 as against 32 in 1906. The number of companies having gross receipts between $100,000 and $500,000 is given as 199 in 1907 as against 156 in 1906.

There is no publication which presents the earnings and

expenses of street railways in full and satisfactory form, principally for the reason that the street railways do not make full returns. The Red Book is, on the whole, the most satisfactory source of information, and it is a very important reference book for anybody who requires detailed information about the street railways of the country.

Letters to the Editor.

RESPECTFULLY REFERRED TO MR. NICHOLS.

CANADIAN PACIFIC RAILWAY, EASTERN LINES.
Montreal, July 15, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Referring to the question proposed by William Nichols, of the Southern Pacific in your issue of June 26, page 369: If, as stated, the trains mentioned could all meet between C and D under the flagging arrangement, I would like to ask Mr. Nichols if he really thinks that the trainmen and enginemen on any railroad, after consultation in the manner described, would be foolish enough to act upon an arrangement of that kind, knowing full well that all trains concerned could move? I would be loth to believe that the intelligence of our railroad men was at such a low ebb.

G. T. ROOKE,
Inspector Train Despatching.

TRAIN DESPATCHING BY TELEPHONE.

McComb City, Miss., July 15, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

I have read, with considerable interest, the articles appearing in your paper with respect to train despatching by telephone. The Liberty-White Railroad, of which I am the operating head, has handled its trains by telephone since the completion of its present mileage, about four years ago.

In the beginning, we considered only the system of telegraph despatching in vogue for so many years; however, after weighing the matter, in all its forms, we reached the conclusion that our road could be better and more economically handled by telephone than by any other known system. Accordingly we installed a full metallic line of No. 10 B. B. wire using a simple 1,600 ohm bridging telephone at each agency station, and a similar instrument at each spur or siding where train orders are likely to be received. The handling of our trains is done in the ordinary manner, in that the despatcher reads to the agent who, in turn, repeats and underscores each word as repeated. When completed, agent sends completion signatures as usual.

At side tracks where trains are met or passed (when necessary) the conductor takes the order in person, acting as an operator who would regularly do it; except that the conductor makes an extra copy, depositing it in a lock box prepared for that purpose. It is intended that these copies be checked with the originals, and should an error occur it would be easily traceable. In all our four years' operation we have never had an accident or an improper order which might be traceable to train despatching by telephone. We find that, aside from train despatching, the line is admirably adapted to the handling of other business, particularly that of the traffic department.

While our road is as yet a short line, we have handled by our present system as many as 30 trains a day without any inconvenience whatever. In fact, we believe that with the telephone it is possible to handle a larger number of trains than is possible with the telegraph system.

In our experience we have saved considerable delay when breakdowns occurred between stations, for the reason that our conductors go to the most convenient side track and use telephone, thus getting quick communication with the despatcher. A striking case of this kind occurred a few days ago when the engine of one of our passenger trains was disabled at a point five miles west of McComb, the nearest agency station. There being a siding within one-half a mile of the accident, the conductor was placed in communication with despatcher within a few minutes. We were thus enabled to get another engine to the train and handle same to its terminal with only a delay of about 30 minutes, when, if handled by telegraph, the walk of five miles would have been necessary before the information of the break-down could have been imparted.

We believe that there is much in store for the telephone in practical train operation. We would not think of laying it aside for the telegraph.

W. M. WHITE,
Vice-President and General Manager, Liberty-White Railroad.

WOODEN AND METAL TIES.

Washington, D. C., July 9, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

I have read with keen interest the excellent article by W. C. Cushing in the June 5 number of the *Railroad Age Gazette*, and I have also been equally interested in reading the paper of Mr. Harrmann, as printed in previous numbers of the *Railroad Age Gazette*.

The Forest Service is in entire accord with the two conclusions reached in Mr. Cushing's discussion of the subject of wooden and metal railroad ties. If we are to continue the use of wooden ties, it is absolutely necessary that we must as a people, and the railroads must as a great factor of our commercial life, adopt a systematic plan of protecting and reproducing the forests. The treatment of the wooden tie to make it more durable is a secondary step, and cannot, of course, be carried out unless attention is given to the first essential step, that of forest conservation.

Taking the other side of the proposition, we should undoubtedly make a grave mistake if we failed to keep fully informed as to what results our own and other countries are having with metal ties. I have especially noted the suggestion in Mr. Cushing's article, that the Forest Service assist in doing this.

In 1890, and again in 1894, E. E. R. Tratman prepared for the Division of Forestry comprehensive reports on the experience with metal ties up to those dates. The Forest Service has fair facilities for securing the data necessary to bring our information up to date, and with the help of the engineers and others who are especially concerned in the subject, it will attempt to do so. The Service will attempt to get together all the information it can from the literature which has been published, and from direct reports from the governments and companies which have used metal ties during the past 15 years. The Service would appreciate very much suggestions as to the main points to be covered in securing these data. It desires to make the results as useful as possible, and it appreciates the necessity of having the fullest co-operation of all who desire to get the best information on this important subject.

WM. L. HALL,
Assistant Forester, U. S. Dept. of Agriculture.

ADVANCING FREIGHT RATES.

New York, July 15, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Responsible railroad managers have recently claimed that railroad freight rates ought to be advanced, the reason assigned being that the railroads need more money. The claim is not made in behalf of railroads which have difficulty in meeting their working expenses, or are in danger of failing to earn the interest on their bonds. Indeed, it is urged chiefly for some which still pay dividends, and which, should the present depressed condition of business continue, would yet, doubtless, be able to pay all fixed charges and have something left over. They are, however, engaged in enormously costly improvements, which, when completed, will enable them to

do more work (for which, just now, there is no call), to do their work better, and to do it more economically. To complete their improvements they need more capital. They have been getting it lately on hard terms. Should they reduce dividends, it is possible that their credit will be still further impaired, while an improvement in net earnings for a few consecutive months would probably enable them to get the capital they need on acceptable terms. Some seem to believe that an advance in freight rates will secure such an increase in net earnings.

But there is something else to consider: Traffic is light because production, chiefly the production of manufacturing and mining industries, has been reduced. In by far the greater part of these industries the owners accept a very narrow margin of profit rather than close their works or leave large parts of their plant idle. They have been compelled to reduce their prices to get customers. With prices low enough, in course of time, they hope to be fully occupied again, and then prices will rise naturally. It is true that the present period of reduced production has been characterized by an unusual resistance to reduction in prices. First of all, wages have been maintained in many industries at the highest rates ever known, in spite of the fact that a great many men are idle. This in itself has prevented such a reduction of prices as usually occurs at such times. Then some of the industries where great combinations exist—the iron industry conspicuously—seem to have believed that a very great reduction in output would be a less evil than a reduction of prices. Prices of iron had to be reduced, nevertheless.

Now railroad rates are, or should be, pretty closely adapted to the ability of producers to pay. Until about a year ago they could pay the existing rates and, most of them, make great profits. Now they make small profits, or none, while paying the same rates. What will they do if rates are raised? Will not an advance in rates postpone the day when they will be able to market all they can produce, and will fill all those cars now standing on side tracks?

There are some kinds of freight the production of which, for a considerable period at least, is not likely to be greatly limited by lower prices or by higher freight rates. The man cultivating 200 acres of land, the produce of which brings him in $2,000 a year, on the average, will not cease to cultivate it if it brings in but $1,500 this year, whether the reduction is caused by chinch bugs or by higher railroad rates; and the farms afford directly an enormous amount of freight, and indirectly a great deal more. But it is probably not necessary to intimate that any considerable increase in railroad profits directly traceable to a reduction in the farmers' profits, even as little as a dollar an acre, would be likely to be eventually very costy to the railroads.

The situation of a number of the most important railroads is peculiar. Their traffic had outrun all calculations. While ordinarily an addition to traffic imposes but a trifling addition to expenses, when the limit of capacity is reached, the addition compels a provision of new facilities, which, in all reason, should be made to accommodate not only this year's increase, but the increase for years to come. Every additional train on the single-track road means a more than corresponding addition to profits, until the limit is reached; when for one more train a second track must be provided, at a cost for interest on cost alone, of several times as much as that train will yield. Many of our railroads seem to have reached that point before 1907; and they are wisely providing not only for the traffic growth of that year, but for that which may be expected by 1917.

As to the financial difficulty, it may be suggested that if the strong companies during the last ten years had raised more of their new capital by new issues of shares, and kept down their fixed charges, they would be able, even in these times, to raise all they need at moderate rates of interest.

S. WRIGHT DUNNING.

RAILROAD CONSTRUCTION IN TEXAS.

Austin, Tex, July 2, 1908.

To the Editor of the Railroad Age Gazette:

The following is an approximate statement of railroad mileage built in Texas during the year ended June 30, 1908:

	Miles built.
Beaumont & Great Northern; Onalaska to Livingston	12.90
Beaumont, Sour Lake & Western; Sour Lake to Houston	64.28
Burr's Ferry, Browndel & Chester; Aldridge to Turpentine	4.02
Chicago, Rock Island & Gulf; Irving to Carrollton	10.82
Chicago, Rock Island & Gulf; Amarilla to Wildorado	21.30
Galveston Terminal: In the City of Galveston (main line)	4.26
Kansas City, Mexico & Orient; Knox City to Truscott	22.50
Kansas City, Mexico & Orient; San Angelo north	12.00
	34.50
Roscoe, Snyder & Pacific; Roscoe to Snyder	30.21
St. Louis Southwestern; Warsaw to Broaddus	6.90
Southern Kansas; between Panhandle and Amarillo (net)	10.90
Southwestern of Texas; Henrietta to Scotland	19.55
Stephenville, North & South Texas; Stephenville tn Hamilton	42.70
Texas & New Orleans; Port Arthur Branch	3.70
Texas State Railroad: Rusk to Meshaw	15.70
Weatherford, Mineral Wells & North-Western; Mineral Wells to Graford	20.64
Wichita Falls and Southern; Wichita Falls to Olney	39.70
Total	341.18
Mileage constructed on June 30, 1907, as shown by the annual report of the Railroad Commissioner (1907)	12,575.56
Total approximate mileage in Texas on June 30, 1908.	12,916.74

The above does not include electric interurban railroad in operation in Texas, as follows:

	Miles.
Denison & Sherman Railroad; Denison to Sherman	8.0
North Texas Traction; Dallas to Forth Worth	32.0
Temple & Belton Electric	8.0
Sherman & Dallas Electric	64.0
Total	112.0

Neither does the above include about 300 miles of private railroad, logging roads, tram roads, etc., which serve only private industries such as lumber and planing mills, and which are not recognized by the State Railroad Commission as common carriers.

The following railroads were building on June 30, 1908, in Texas, or some actual construction work had been done. (On some of these roads work is for the present suspended.)

	Miles.
Burr's Ferry, Browndel & Chester; Turpentine to Browndel	19.0
Kansas City, Mexico & Orient; Truscott to Red River	58.0
Kansas City, Mexico & Orient; Sweetwater south	65.0
	123.0
Pt. O'Connor, Rio Grande & Northern; Yoakum to Pt. O'Connor	75.0
Texas State Railroad; Meshaw to Palestine	15.0
Wichita Falls & Southern; Olney south	15.0
Chicago, Rock Island & Gulf; Wildorado to Texas-New Mexico state line	49.0
Total	296.0

The following railroads have been chartered and are considered to be the substantial projects. These do not, however, include all railroads that have been chartered.

Abilene & Ballinger; Abilene to Ballinger	53
Colorado, Hereford & Gulf; State line via Dalhart to San Angelo	420
Gulf, Santa Fe & Northwestern; Brownwood to Texico	350
Estacado & Gulf; Roby to Coleman	100
Kansas City, Mexico & Orient; San Angelo to Rio Grande	314
Kansas City, Mexico & Orient; San Angelo to Del Rio	160
	474
Port Arthur & Houston Short Line; Port Arthur to Dumont	86
Sabine Valley; Marshall to Porth Arthur	206
South Texas & Gulf; Artesia to Carrizo Springs	40
Total	1,723

On June 30, 1908, Texas had approximately 12,917 miles of main line of railroad within her borders, exclusive of some 112 miles of electric interurban railroad and about 300 miles of private railroad, which include the logging and tram roads of lumber companies.

On the basis of 265,000 square miles she has one mile of railroad to every 20 square miles of territory; and on the basis of 3,500,000 population she has one mile of railroad for every 272 people.

The report of the Interstate Commerce Commission for 1906 showed that Illinois had one mile of railroad for every 4.6 square miles of territory; Pennsylvania one mile for every 4.0 square miles; New York one mile for every 5.6 square miles; Missouri one mile for every 8.5 square miles; Kansas one mile for every 9.2 square miles, and Texas one mile for every 21.0 square miles. Although Texas is not so populous as these states, her population is increasing very rapidly, and her railroad mileage is not keeping pace with this or with her development in other ways.

To-day there is a very insignificant amount of railroad being built in Texas. During the past few years, while a great deal of railroad has been projected, and a large number of companies have taken out charters authorizing construction, actual work has progressed on the great majority of these only to the extent of making preliminary surveys for some of them, and attempts to finance them.

The greater part of this mileage was projected in territory which has already been largely developed agriculturally or whose fertility and productiveness has been proven, and only awaits the advent of transportation facilities to insure its rapid settlement. From a financial point of view, ordinarily the building of railroad in such localities would offer very handcome returns on the investment. Also, in practically all cases the construction of these lines has been encouraged by liberal, and in some instances, unusual offers of land and money by individuals and communities, in addition to the right of way and depot grounds.

But notwithstanding these advances by citizens, and the tempting prospect of building railroad in fertile and fast developing territory where there is little competition from other lines, thus practically insuring the payment of all expenses of operation and a fair return on the investment from the beginning, the consummation of these enterprises has been exceedingly slow. Perhaps in the United States there exists no opportunities, superior or even equal to these, for making profit out of building and operating railroads. Certainly no more favorable chances obtain for securing gain from the investment in and sale of land, town lots, etc., and the bonuses offered together with the usual profits of construction, make the prospective returns on the necessary capital required to promote the railroads very large. The field for making money along these lines is very attractive, and, if properly managed, in a measure certain. Valuable franchises can now be easily secured that will prove very valuable to those who have the foresight to obtain them.

The reasons advanced for this practical dearth of railroad construction in a state where there is no controversy in regard to its necessity, and where the opportunities for making money out of the construction and operation of railroads are so flattering, are several. The recent panic is given as the main cause of the present difficulty. Some hold that the legislation in Texas during the past few years has been so adverse and antagonistic to railroad and other corporate interests, that this has discouraged the investment of money by outside companies within Texas' borders. Others maintain that the policy of the present Railroad Commission, in reducing freight rates and otherwise coercing and imposing unjust and unnecessary burdens on the railroads, is responsible for the timidity and reluctance now shown by foreign capitalists towards investing in her enterprises.

However true it may be that to the reasons given, may be due, wholly or in part, the responsibility for the present situation, the fact remains that railroad building is now practically at a standstill in Texas. But in view of the brilliant opportunities for investing capital in these enterprises, and the further fact that the general development of the state makes absolutely necessary the early extension of the present facilities, such a status cannot long exist. If, as it is insisted, the present laws and the attitude of those in authority are unjust and inimical to the securing of a fair return on capital invested in, and advanced for the promotion of legitimate enterprises in this state, a fair and right minded people will insist that the evils be corrected. A condition of affairs cannot long remain that will admit of injustice being done. A state of equilibrium must be reached which will guarantee protection to all parties, individuals or corporations, in their moral and legal rights. It may be that the experience which this state is now undergoing is a valuable one; one that will ultimately have a salutary effect on the legislative and administrative authorities, and hasten the enactment of laws and the establishment of policies that will be favorable and just, if those now in effect are, as a matter of fact, unjust.

I believe, however, that the present laws and administration thereof in Texas are, as a matter of fact, not adverse to corporate interests. It is thought that the real situation is not correctly understood by those outside of the state, especially in the money centers of the East. The public mind has been misled and poisoned by unjust and unfair criticisms of Texas and her laws published in papers and journals subservient to corporate interests outside of the state, with the express intention of influencing and coercing legislation which would grant special favors to corporations, and at the instance of zealous advocates whose interests lie within her borders. These attacks have had the effect of creating an improper sentiment and have tended to promote, temporarily at least, a feeling of hesitancy and uncertainty in the minds of capitalists outside of the state, who might otherwise have readily invested in her securities.

It is safe to assert that those charged with the enactment and administration of the laws in Texas are fair minded and honorable men, who would not countenance nor approve of any injustice to individuals or corporations. They have made an honest endeavor to deal fairly with all corporate interests, and at the same time to require that these share equitably the burdens of taxation, etc. Their effort has been also to protect the people and private interests against corporate exactions, and it is this sentiment that has been misconstrued by prejudiced organs and represented as an attempt to coerce and exact unjust contributions, which have the effect of confiscation of property.

The state of Texas was never more prosperous. It is predicted that the transportation lines will again be taxed to their utmost capacity to move the agricultural products to the markets and care for the general business tendered them. The tide of immigration still continues to swell the population of the state, and large amounts of fertile land in the western and other undeveloped portions are being rapidly taken up and put into a state of cultivation by actual settlers. The necessity for increased transportation facilities in these sections is evident.

In view of these conditions, Texas should now be entering an era of extensive railroad building. To keep pace with her development, agriculturally and otherwise, not less than 1,000 miles of railroad should be added per annum for the next ten years to the present mileage. The indications, however, are that only a very small part of this will be built at least for some years. Several years are required to project and finance a railroad system of any considerable extent. Very little of this is being done now, and even if confidence were restored in the money centers and capitalists were convinced of the security and profitableness of investments in Texas railroad securities, it would require several years to begin needed railroad construction.

It is expected that a few short lines will be built where the inducements in the way of land and money bonuses are large, and the probable profits of construction more than usual. These, however, will be built by companies who will expect large returns on the money advanced for construction, with the view of leaving the matter of operation to chance conditions. Since bonuses cannot be secured from the state that will aid in the construction of these roads, the local citizenship must come forward and provide large and substantial donations in order to secure them. It is upon these that the burden of present conditions must fall, at least for a time.

R. A. THOMPSON,
Chief Engineer, Railroad Commission of Texas.

TRACING L. C. L. FREIGHT.

Pittsburgh, Pa., July 18, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The inadequacy of L. C. L. tracing systems, as in effect on the majority of railroads, is brought to notice by the dissatisfaction felt almost universally in this country. I have discussed this question with many men in a position to give an intelligent opinion on the matter, especially with trace clerks familiar with the details, as essential to their duties, and the matter is fresh in my mind through actual experience with the railroad companies by their seeming failure to either give proper attention to such tracing or to defective systems.

It is always the cry of the railroads to promote the policy of not tracing material until sufficient time has been given for the consignment to reach its destination. This really must appeal to a large shipper, or to any person, familiar with

the extra work entailed by such tracing as, being a consistent order or request and giving the railroad a chance to obviate any unnecessary work. The rule would apply, if applicable, in all cases, this being one point of dissension. Although it might come to such a point, I do not think it would be fair to force the railroad to name a time for each shipment to move to destination, based on mileage, tonnage, rate and operating conditions, as such a schedule would be subject to changes at all times. I have often heard expressions of such a plan being in favor and, of course, know that the matter was not given due consideration as to the amount of work involved.

Eliminating that plan from the discussion, we will say that after a reasonable time, a tracer is started. All roads have their special tracing departments, carried under the claim, tracing and generally the freight departments, the latter being handled usually by the division freight agents. Most of the tracers are started at original point of shipment and followed through to each billing point by the agent at such points, forwarding papers with his record to the next *billing* point. As the tracers will show, some agents have the facilities to handle the claim or tracer with despatch, while others will hold the correspondence an unreasonable length of time before replying or giving advices to the next agent.

If the agent has an insufficient office force to handle such correspondence without delay, the remedy is obvious and should be made. If delay is occasioned otherwise, proper attention should be given to same by the division freight agent and discipline enforced, if necessary. Delays like this tend to actually excite the anger of the railroad companies' patrons, so that appreciation and courtesy should be shown to the patron when annoyance of this kind is given. I know that railroad companies can win many friends in this way.

The soliciting departments owe many failures to the one reason of delays to correspondence when patrons are tracing their consignments. Instead of trying to discourage L. C. L. tracing (as some railroads do) efforts should be made to perform and render efficient service.

To my mind a simple method to cover each point would be:

First.—Start the tracer at original point of shipment, with file number shown on original and carbon copy, keeping the carbon copy for reference.

Second.—Forward to next station that car is carded to and not to next billing point unless car is carded to same point.

Third.—The second correspondent to forward original, with his reference, to the next carding or billing point and copy to originating point with file number as shown on original.

Fourth.—The next correspondent to handle in same manner as previous correspondents, until delivery is shown. If shipment is delayed, a reasonable time should be allowed to elapse, after which advice at certain intervals should be furnished relative to delay and prospects for forwarding.

In this manner, all the billing reference is always at hand to refer to in case shipment is handled at a station where no car number reference is kept and shipment has been forwarded in advance of tracer. Billing and car reference advice should be kept for record purposes only, if for nothing else, as there is no reason why it cannot be done, which is proven by the fact that many large transfer stations have the system in vogue for their own use, if not for the use of the public.

The sending of each agent's advice to the original tracer entails extra work when the correspondence is voluminous, but this point is offset by the satisfaction given to the shipper who can get his advice from the agent with whom tracer was started. It also affords a consignee considerable benefit in arranging shop schedules, etc., by watching the progress of a certain line of goods which is, or is applicable to, an order going through his mill and which can be started to advantage at an opportune time, judged by his tracing advice. I know this method can be worked out to advantage both to the railroads and public, and would like to see it inaugurated on some of our large lines where the effects could be felt.

F. M. G.

JUDGE KOHLSAAT'S DECISION; MONON ADVERTISING TRANSPORTATION CASE.

Following is the text of the opinion rendered by Judge C. C. Kohlsatt, of the United States Circuit Court for the Northern District of Illinois, on July 15, holding illegal, under the Hepburn act, Section 6, the exchange of railroad transportation for the advertising:

United States of America v. Chicago, Indianapolis & Louisville Railway Company.

KOHLSAAT, J.—The government files its petition herein under the provisions of Sec. 3 of the act of February 19, 1903, creating a summary remedy in certain cases, and seeks thereby to prevent the defendant from giving transportation in exchange for advertising, in accordance with the terms of a contract entered into between defendant and *Munsey's Magazine*, which reads as follows:

"Agreement between the Monon Route (Chicago, Indianapolis & Louisville Railway Company) and Frank A. Munsey Co., Publisher. Entered into this 24th day of January, 1907.

"1st. The said publisher agrees to publish in said publication an advertisement of the Monon Route, as follows: One page 'ad' (divided as desired), said advertisement to appear favorably and to occupy a space of not less than one page and to be published as desired issues of said publication.

"2nd. In full consideration of the foregoing advertising, the Monon Route agrees to issue the following non-transferable transportation, based on the regular published rate: Trip tickets or mileage to the value of five hundred dollars ($500), for the personal use of the publisher, his employees or immediate members of his or their families, which said transportation shall be limited for use not later than December 31, 1907.

"3d. Under no circumstances must the transportation issued under this contract be sold or transferred to or used by any other than the person to whom issued, as such sale, transfer or use would be a misdemeanor under the law.

"4th. It is understood and agreed that the transportation issued under this contract shall read to points on the Monon Route, and not to points on any other road.

"5th. No extension of time on any transportation issued under this contract shall be given by the Monon Route or requested by the publisher beyond the date of the expiration of this contract.

"6th. In case said publisher severs connection with said publication, or sells or transfers his interest therein, then said transportation shall at once be surrendered to the Monon Route, and no new transportation shall be issued on account of said publication until after that originally issued has been returned to the Monon Route. Should any person holding transportation issued hereunder sever connection with the publication, or should the publication suspend, or if the transportation should be presented by any person other than the one named thereon, then the Monon Route will refuse to honor the same for passage, and take the same up and collect full fare, and such presentation shall be taken and considered as a breach of contract; and it is hereby agreed that the suspension of said publication before the expiration of this contract, or the presentation of non-transferable transportation by any other than the person named thereon shall cause this contract to be void and operate as an offset to all transportation which might be considered as due to said publisher. Further, should said publisher or any person named on said tickets allow any person to use the same or offer to sell or transfer the same, then said publisher agrees to pay the said Monon Route as a penalty the full rate of fare which would have been paid for reguluar tickets.

"7th. The said publisher further agrees to deliver to said Monon Route, at its general office in Chicago, one copy of each issue of said publication in which said advertisement appears, free of charge, during the life of this contract.

"8th. This contract expires December 31, 1907, unless otherwise stipulated."

The petition charges that the action of the defendant in issuing such transportation constitutes a violation of the statute (Hepburn act) which prohibits a carrier from accepting in payment for transportation any compensation greater or less or different from that named in the published rates.

Defendant insists that it receives full money value for what it grants, at regular schedule rates, and denies that the transaction comes within the act. It also sets up the Indiana act authorizing such exchange. This latter defense cannot be availed of in this proceeding. The matters in issue are concededly interstate commerce transactions, as to which, it is

well settled, a state statute is ineffectual. The federal law alone applies.

Practically, the question submitted is whether transportation supplied in accordance with the terms of the contract constitutes a rate greater or less than, or different from, that given the general public. The question as to the value of the advertising is a contested one. Manifestly, there can be no fixed price placed upon it. The matter of copies issued, the character of its subscribers, and very many other questions enter into the estimate of its worth. It is, therefore, impossible to say what its cash or market value is, except by comparison with other advertising rates. It cannot be said that the evidence is conclusive or even convincing on the point. Indeed, if it is taken at its cash value, why should the transportation be limited as specified in the contract? If the magazine is paying $500 to the defendant, why does it accept transportation both of less and different value than it would accept if it bought its tickets with money? Why embarrass itself with menacing pains and penalties for failure to observe all the conditions of the special contract, when by the use of cash it may travel and give no concern to technical limitations?

It seems fair to conclude that either the advertising is of less cash value, or the advertisers are grossly imposed upon by the railroad. It does not follow, however, that the transportation furnished under the contract set out is not furnished under substantially similar circumstances and conditions as any other contemporaneous service. It is the same service—the same act of transportation as that furnished the public.

It is insisted by counsel for complainant that railroad tickets may, in any case under the interstate commerce act, as it now stands, be bartered as so much cash in payment of indebtedness of the railroad. By rule made effective September 18, 1906, the Interstate Commerce Commission has ordered that:

"Nothing but money can be lawfully received or accepted in payment for transportation subject to the act, whether of passengers or property, or for any service in connection therewith, it being the opinion of the Commission that the prohibition against charging or collecting a greater or less or different compensation than the established rates in effect at the time, precludes the acceptance of services, property or other payment in lieu of the amount of money specified in the published schedules."

In United States v. A. T. & S. F. R. R. Co., decided by Judge Wellborn, of the Southern district of California recently (not yet published) it is said:

"A rate to be uniform in its operation, must necessarily be expressed in dollars or cents. * * * So to interpret the law as to allow the carrier to disregard said mode and to accept a part only of its compensation in money and the balance in a commodity, or by way of compromising a claim, would invite and open wide a door to the very discrimination which the statutes were designed to suppress."

In Union Pacific Ry. Co. v. Goodridge, 149 U. S. p. 680, the court had under consideration a demurrer to an answer setting up the satisfaction of what the court terms "an unexplained, indefinite and unadjusted claim for damages" in regard to which it says:

"While we do not undertake to say that a railroad company may not justify a fixed rebate in favor of a particular shipper by showing a liquidated indebtedness to such shipper, which the allowance of the rebate was intended to settle, it would practically emasculate the law of its most healthful feature to permit an unexplained, indefinite and unadjusted claim for damages arising from a tort, which, though liquidated for some time, never seems to have been prosecuted to a final determination in the courts, to be put forward as an excuse for a clear discrimination in rates."

And further on:

"To hold a defense thus pleaded to be valid, would open the door to the grossest frauds upon the law and practically enable the railroad company to avail itself of any consideration for a rebate which it considers sufficient, and to agree with the favored customer upon some fabricated claim for damages which it would be difficult, if not impossible, to disprove.

"There is no doubt of the general proposition that a release of an unliquidated claim for damages is a good consideration for a promise, as between the parties, and if no one else were interested in the transaction, that rule might apply here; but the legislature, upon grounds of public policy, and for the protection of third parties, has made certain requirements with regard to equality of rates, which, in their practical application, would be rendered nugatory if this rule were given full effect."

It will be noted that the contract does not require that the advertising must have been furnished before the transportation is given. There is no restriction upon the advertiser to call for his railroad tickets only so far as earned. He could, under the contract, demand them all at once if he chooses, and at the beginning of the term, before anything is earned. In the mere matter of interest, the rate would be less and different from that which is published.

In the case of Motley et al. v. Louisville & New Orleans R. R. Co., 150 Fed., p. 406, Judge Evans sustained an agreement made on October 2, 1871, by the road with Motley and wife for the granting of passes for each of their lives in consideration of their release of their several claims for damages growing out of personal injury. In the course of his opinion (p. 409) he says:

"Did Congress intend to abrogate such previously made contracts founded upon valuable and legitimate consideration? Certainly it did not say so. Was the abrogation of such pre-existing contracts within the policy of the legislation referred to? There is nothing to indicate that it was, *although it is obvious that contracts of a similar nature could not be made after the act became effective.*"

It is of interest, in this connection, to note, as bearing upon the trend of congressional legislation, that on January 14, 1908, a bill was introduced in the United States Senate to amend the law so as to permit public carriers to issue transportation in exchange for advertising, and that the bill was, by unanimous vote of the committee having it in charge, reported upon adversely.

Transactions such as those under consideration may not be open to the specific objection condemned in the Goodridge case, but they would seem to present just as convenient a device for evading the statute as the one there stated. So far as the record discloses, the particular matters here involved might not be open to this objection, but there is more included than the mere question of advertising. As said by Mr. Justice Brown in the Goodridge case, *supra*, "It" (the railroad) "is bound to deal fairly with the public, to extend them reasonable facilities for the transportation of their persons and property, *and to put all its patrons upon an absolute equality.*" If it be lawful to make the exchange of railroad transportation for advertising, then it would be lawful to do the same in every transaction, and the railroad business might lawfully become one of barter and sale, limited only by the demand.

This case does not come within the terms of the Goodridge case. The suggestion of the court with reference to liquidated liabilities does not apply to a situation where the indebtedness is by contract made payable only in transportation. In other words, here the railroad is not settling a liquidated liability, but is agreeing to settle a future liability with transportation.

There is no mistaking the trend of the lawmaking and constructing powers. Every new step is tending toward a most rigid enforcement of the rule that requires exact equality in the matter of rates. When by the Hepburn act the word "different" was added to the words "greater or less," it is not unfair to assume that Congress intended to make the law more explicit and more difficult to evade. As was said in Armour Packing Company v. United States, 209 U. S. 56:

"The Elkins Act proceeded upon broad lines and was evidently intended to effectuate the purpose of Congress to require that all shippers should be treated alike, and that the only rate charged to any shipper for the same service under the same conditions should be the one established, published and posted as required by law."

This purpose is even more apparent in the Hepburn act. The plain intention is to close every avenue against discrimination. Bearing this in mind, the courts have not been, and will not be, disposed to hesitate in giving significance to changes in the language of the statutes as they occur from time to time. "The interstate commerce act," says the Supreme Court in the Armour case, "is not only to be read in the light of the previous legislation, but the purpose which Congress evidently had in mind in the passage of the law is also to be considered."

It is conceivable that a case may arise in which, from the nature of the facts involved, it might be difficult, if not impossible, to say whether the rate is greater or less than the published rate, which would, nevertheless, be covered by the term "different" within the meaning of the whole act. It is essential to the spirit of the whole statute that the value of transportation be fixed and certain. In no other way can it

be held to be exactly the same to all. If one person may purchase it with advertising, another with labor, and another with produce, the value of which is a matter of agreement between the parties, how can it be said the schedule rate is always maintained? Would not the rate rest in the whim of the carrier? Such is not the intent of the law. To say to one man, "You must pay cash," and to his competitor, "You may pay in service or merchandise at prices we may agree on, be it more or less than the market price," would seem clearly to constitute such a difference in transportation as is condemned by the act.

Some claim is made by defendant that the government's contention would exclude the use of checks and drafts and bills of exchange. This is without weight. In practical business usage, these instruments pass as cash. They are utterly free from the objections which attach to trade and barter, and are clearly without the ban of the statute.

If the foregoing be correct, it follows that, both upon the particular record in this case and upon broad principles of law, the action of the defendant in the premises is in dissonance with the letter and spirit of the interstate commerce act. The injunction is granted as prayed.

THE USE OF SUPERHEATED STEAM IN LOCOMOTIVES.

BY DR. WILHELM SCHMIDT.

II.

The low thermal conductivity of superheated steam is an excellent feature after the steam has reached the cylinder, as it greatly assists in preventing condensation. On the other hand this peculiarity is a great disadvantage, so far as the creation of the superheat is concerned, as it impedes the free transmission of heat from the combustion gases to the steam. Special care must therefore be taken, in the designing of suitable superheaters, to facilitate the transference of heat and to ensure an efficient use of the fire gases. The bulk of the boiler steam must be divided into as many thin streams as possible so as to ensure sufficient length of contact between the steam and the heat, and the gases must be kept in close contact with the superheater tubes. It is necessary, also, to give the steam in the superheating tubes repeated reversals of direction so as to ensure that the moist and superheated particles become thoroughly mixed.

Further, it is not sufficient merely to supply heat to the steam; the gases must have a high temperature in order to overcome the resistance of the low conductivity and to effect the necessary heat transfer to the rapidly flowing steam. A superheater which is placed in the smokebox, and which uses only the ordinary waste gases, cannot give a sufficient degree of superheat, even with the largest area of superheating surface.

The velocity of the steam also has an influence. Ripper found from repeated experiments "that within certain limits the higher the velocity of the steam passing through the superheater, the more rapidly the heat was taken up by the steam." Similar results were obtained with the author's new smoke-tube design, in which, by doubling the paths traversed by the steam, and thus doubling the velocity of the steam, the efficiency of the superheater was greatly increased.

It is also essential to provide for the protection of the superheater parts against overheating, especially while the engine is standing or floating. Then no steam is flowing through the superheater tubes to take up the heat from the gases, which heat would be concentrated in the tubes, and the latter would thus become overheated and be likely to burn. Suitable dampers must consequently be arranged for the purpose to shut off the flow of the gases through the superheater when the engine is standing or running free.

From the foregoing disiderata the following general rules for the design of efficient and reliable locomotive superheaters can be deduced:

(1) The application of gases of high temperature (about 1,500 deg. F.).

(2) The subdivision of the superheating surface by the use of many narrow and thick-walled superheater tubes.

(3) Provision for the regulation of the flow of the gases.

(4) High velocity and repeated mixing of the steam currents on their way through the superheater.

FIREBOX SUPERHEATERS.

In one respect, this type of superheater is the most efficient, since, on account of the high temperature of the combustion gases, a comparatively small superheating surface, and consequently an apparatus of small weight, is sufficient to generate a high degree of superheat. With such superheaters, however, the principal difficulty is to provide ample protection for the apparatus against the high temperature of the gases, and against the heat directly radiated from the fire, especially while the engine is running free or standing. Then no steam is flowing through the superheating tubes to cool them, and in consequence of the concentrated heat, the tubes get overheated and burnt. Damper arrangements in the firebox, to shut off the superheater when the regulator is closed, could not withstand the fire, and as long as no other reliable protective means for firebox superheaters are known, such apparatus cannot be regarded as practicable, and must, therefore, be excluded from further consideration.

BOILER-BARREL SUPERHEATER.

The ordinary boiler flues are made to act partly as superheating tubes, either by providing some or all of the smoke tubes for a portion of their length with jacketing tubes, so that

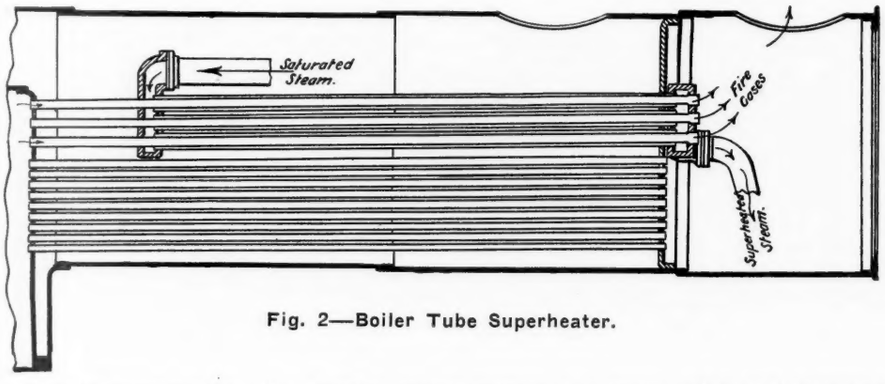


Fig. 2—Boiler Tube Superheater.

the annular spaces between the smoke tubes and jacketing tubes form the superheater (Fig. 2), or else the boiler flues are enclosed for a part of their length by a box of nearly cubical construction, which constitutes the superheater (Fig. 3). The former design, of which one arrangement is shown in Fig. 2, has not, so far as is known, yet been tried in practice, and hence the author will deal only with the latter type, shown in Fig. 3, of which type several modifications have already been used, *e. g*, the superheaters of Slucki, Pielock, and Clench.

The principal defect of these designs is the weakening of the boiler flues, which should act as the main stays between the tube plates. These tubes are surrounded for part of their length by steam which does not conduct the heat so well as water, and the strength of these stays is seriously impaired by this irregular heating.

The tubes within the superheater box are in danger of becoming overheated, especially as no practicable way exists for shutting off the superheater when no steam is being used. Dampers in the smokebox cannot be applied, as they would have to shut off the whole boiler. The plan has been tried of

filling the superheater box automatically with water as soon as the regulator is closed, in order to avoid overheating of the tubes. But this is an expensive method of protection, as the water, thus turned each time into the superheater, must be run out again before starting.

It would be simpler to place the superheater box near the smokebox end of the tubes (as in the Clench superheater), as there the temperature of the gases is already so low that no over-heating need be feared. Such superheaters have already been employed in locomotives, but no practicable degree

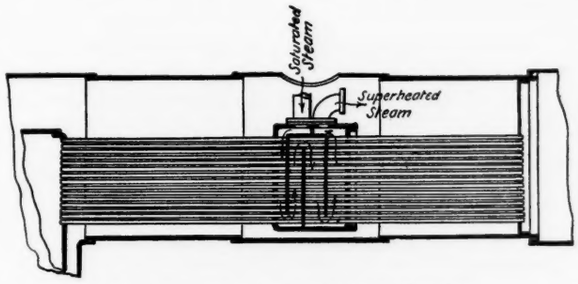


Fig. 3—Boiler Barrel Superheater.

of superheat has been obtainable on account of the relatively low temperature of the combustion gases.

Another disadvantage of this type of superheaters arises from the fact that it is necessary to expand the tubes in four places, and it is very difficult to get the tubes out, owing to the scale deposited on the tubes outside the superheater box. Moreover, the superheater is inaccessible, and any leakage that may occur at the places where the tubes are expanded into the superheater box cannot be discovered. A further defect is the necessity for leading the generated superheated steam, on its way from the superheater to the cylinder, through the water or steam space of the boiler, whereby the degree of superheat is considerably reduced. From tests made at St. Louis with a superheater of this type, the fall in temperature of the steam between the superheater and the cylinders amounted to as much as 140 deg. F. Other serious difficulties have been experienced with this type of superheaters by reason of the rusting of the tubes inside the superheater box.

The only advantages of this system lie in the small weight and the simplicity of the apparatus.

SMOKE-BOX (WASTE GAS) SUPERHEATERS.

The superheating surface is disposed within the smoke-box, and heated by the waste gases. A great variety of locomotive superheaters, differing only in the arrangement of the tubes, are based on this principle. The low temperature of the waste gases, however, renders an effective use of the superheating surface disposed in the smoke-box impossible; such superheaters, indeed, can hardly be made large enough to dry the steam; they can never produce material superheat, and hence the saving in coal and water is scarcely sufficient to cover the expenses of construction and maintenance of such apparatus, even when the boiler tubes are somewhat shortened in order to obtain a higher temperature of the gases in the smoke-box.

Special types of smoke-box superheaters are those in which double tubes are used. The superheating pipes (Fig. 4) are arranged in the smoke-box co-axially with the upper portion of the boiler tubes. The combination gases coming from this part of the boiler tubes pass through the inner superheating pipes, whereas the gases leaving the other portion of the boiler tubes pass over and around the outer superheating tubes; thus the steam is heated from inside and outside. Nevertheless, in consequence of the low temperature of the gases, only very moderate degrees of superheat have been obtained with such arrangements.

Some inventors provide a special furnace in the smoke-box so as to get heating gases of higher temperature there; Hagans, for instance, uses an automatically oil-fed furnace in the smoke-box for this purpose, and Deeley intends to utilize the hot cinders injected into the smoke-box, but both schemes offer great practical difficulties.

A special method of making efficient use of superheating surfaces arranged in the smoke-box has been employed in the author's smoke-box superheater. The furnace gases in the fire-box are divided into two separate currents; the larger one passes through the ordinary boiler tubes and generates steam in the usual manner, while the other and smaller current flows to the superheater in the smoke-box through a single large flue of about 12 in. diameter, disposed in the lower part of the boiler barrel and extending its full length. The gases in this flue are cooled to only a small extent by the water, and therefore enter the superheater at a comparatively high temperature, and are able to effect a high degree of superheat. This superheater has proved very efficient in practice; but it is more expensive to build and maintain, and is also heavier than the smoke-tube apparatus since designed by the author. It has, therefore, been superseded by the latter.

SMOKE-TUBE SUPERHEATERS.

The superheating surface is disposed within enlarged smoke-tubes in the boiler. The superheating tubes are usually U-bent return tubes, and generally there are four of these arranged in each of the enlarged smoke-tubes. Only in a few cases have Field tubes and flat tubes been applied or proposed instead of the ordinary and cylindrical return tubes.

The first practicable locomotive superheater of this type was the author's flame-tube superheater, which was applied to two locomotives of the Prussian State Railways in the year 1897. All U-shaped superheater tubes were circularly arranged in one single smoke-tube of about 18 in. diameter. This flame-tube apparatus served as the starting point for the genesis and development of the improved smoke-tube superheater since invented by the author (Fig. 5). In this new pattern the upper part of the boiler is fitted with from two to four rows of large

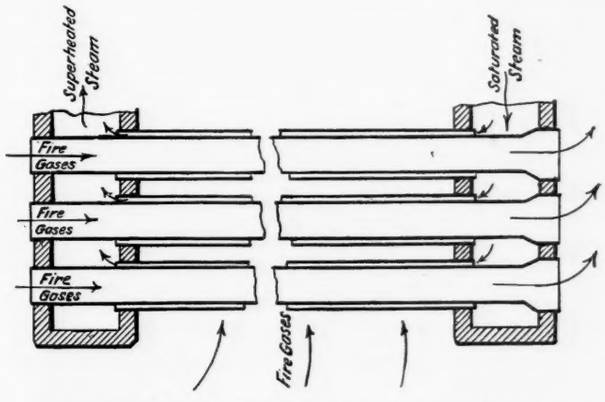


Fig. 4—"Double Tube" Smoke Box Superheater.

smoke-tubes, in each of which is inserted a superheater element consisting of two sets of pipes bent in the form of a U and connected at the smoke-box end to a header. The flow of the fire gases through the superheater smoke-tubes is controlled by dampers in the smoke-box, which close automatically when the regulator is shut. The general arrangement of this superheater, together with its advantages, are already so well-known, that no further description is necessary.

The author needs only to consider, therefore, the question as to whether ordinary return tubes or Field tubes, or other forms of superheating tubes, are preferably employed. Field tubes instead of return tubes have been employed in the smoke-tube superheaters of Cole, Notkine and Churchward.

The ordinary arrangement of a smoke-tube superheater with Field tubes is shown in Fig. 6. It is clear that all such apparatus have the defect that only the steam current flowing in the outer tube from *c-f* is directly heated by the gases,

whereas the inner current flowing from *a-c* must be indirectly superheated by the steam flowing in the outer tube; the latter has, therefore, to be superheated to an unnecessarily high degree.

In Fig. 6 the temperatures of the steam in the inner and outer tubes are shown in diagram form.

Saturated steam from the boiler enters the inner tube at *a* at a temperature, say, of 375 deg. F., and the author will suppose it to be finally superheated to 600 deg. F. As the saturated steam flowing in the inner tube from *a* to *c* cools the superheated steam flowing in the outer tube from *c* to *f*, it follows that, in order to retain at *f* 600 deg. F., the steam flowing in the outer tube must necessarily have a much higher temperature than 600 deg. F. The curves show the approximate range of the steam temperature in the inner and outer tubes. In the inner tube from *a-b* the water suspended in the boiler steam has at first to be evaporated before the superheating process begins. Assuming, for instance, 5 per cent. wetness in the boiler steam, then 42 heat unit must be transmitted for each pound of steam flowing from *a-b* in order to dry it. This heat must necessarily be taken from the superheated steam flowing in the outer tube from *e-f*, thus causing a reduction of superheat of $\frac{42}{0.50} = 84$ deg. F. (0.50 being the specific heat of the superheated steam). The temperature of the steam at *e* must therefore be $600 + 84 = 684$ deg. F. Following its course further up, we find, near the tube end at *d*, a temperature of the steam of probably more than 750 deg. F.

Evidently, this is neither an efficient nor an economical way of transmitting heat from the fire gases to the steam, as the heat coming only in contact with steam of the highest temperature is not absorbed so readily as it would be if it came directly in touch with good conducting saturated steam. The furnace gases will not be sufficiently cooled in the superheater and will leave the latter while still retaining a considerable amount of heat, which, with a more efficient superheater arrangement, could at least be partly utilized.

Further, the outer Field tubes, especially at the weld ends E, are likely to become overheated and to burn, or to allow deposits to form on them, and thus choke up the tubes, due to heat concentration, and to the fact that they are not sufficiently cooled by the steam.

If the steam current is reversed, *i.e.*, if the saturated steam enters the outer tubes at *f*, and the steam leaves the inner tubes at a superheat, the conditions are even worse.

The accumulated iron masses at the firebox end of the outer tubes E, welded like an edge, will increase this tendency to overheating owing to their capacity for retaining the heat, which will soon cause blistering and weakening of the welds.

These defects, characteristic apparently of all superheaters using ordinary Field tubes, apply to the Cole superheater as well as to the Churchward superheater.

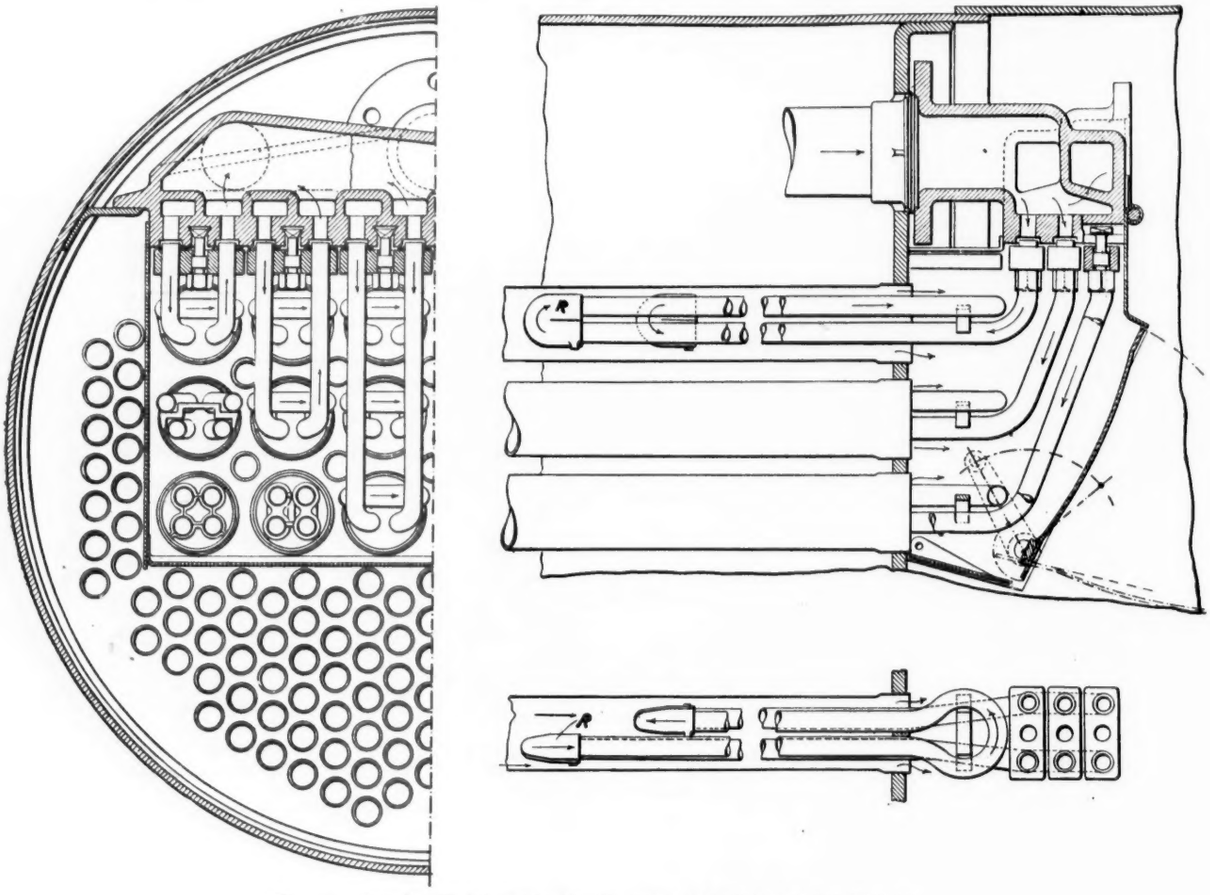


Fig. 5—Smoke Tube Superheater with U-bent Return Tubes.

The latter is in principle very similar to the original Cole superheater. Cole also used in his first superheater designs one and, later, four Field tubes in each of the big smoke tubes, exactly as in the Churchward superheater; the only difference is a mechanical one. Whereas Cole uses intermediate headers to connect the Field tube to the main collector casting, Churchward connects the Field tubes directly to one main header. This change, of course, cannot have any influence on the efficiency of the superheater; and precisely similar results to those already obtained with the Cole-Field superheater in America may be expected from the Churchward superheater here.

As to the practical results obtained with the Cole-Field tube design, the report of a committee on "Superheating," read before the last Master Mechanics' Association, gives some very instructive information. During 1905, the Cole-Field tube

superheater was applied to 21 engines of the M—4b class of the Canadian Pacific Railway, but during 1906 the apparatus had to be removed, and all these engines are now used as "Simple" engines, "on account of the difficulty in keeping the tubes clean and the small advantage obtained."

This statement shows that the author's criticisms of Field tube superheaters is not merely theoretical, but is based on practical experiences.

Returning now to the case of the smoke-tube superheater with U-bent return tubes, as employed in the author's system (Fig. 5), we find that the above-mentioned defects are entirely avoided.

In the latter the gases can transmit their heat directly to the steam required to be superheated, and as this heat is always partly in contact with steam of low temperature, it is readily absorbed so that the gases leave the superheater practically at the same temperature as that of the gases which pass through the ordinary boiler flues.

The temperature of the steam increases steadily during each passage made by the steam through the superheated pipes, and there is no source of dangerous heat accumulation at the smoothly rounded and fire-resisting cast-steel return bends, which are arranged in such a way that the coolest steam first passes the bend R which is exposed to the hottest gases. Moreover, the uniform section of the U-bent tubes gives an even flow of steam, whereas the sudden change of section and direction of the steam at the firebox end of the Field tube causes a sudden resistance and fall in pressure.

These are the principal defects of Field tube superheaters in general.

The only method of making the Field tube apparatus efficient is to isolate the inner tube, so as to avoid cooling the steam flowing in the outer tube. But this "key to the successful application of the Field tube," as it may rightly be called, is covered by patents.

It has thus been shown that the return tube design must necessarily be more efficient and more economical than the Field tube arrangement.

It has also been proposed to use flattened tubes instead of the ordinary circular superheater tubes, thus sending the steam through the superheater in a wide thin jet, with a view to facilitating the heat transmission. The main objection to this proposal is the larger resistance of the flat tubes, and the complications in the pipe connections, which make the device more expensive.

After all, the smoke-tube superheater using circular return tubes at present is the most efficient and practicable superheater for locomotives.

SIZE OF THE SUPERHEATER.

The size of the superheater is determined by:

The total free area of the superheating tubes, and this determines the velocity of the steam; by

The total area of the combustion gases passing through the superheater and their temperatures; and by

The superheating surface.

The fluidity of superheated steam allows of a much higher velocity than is the case with saturated steam. As a rule, the total free area of the superheater tubes in square feet can be taken to about 0.3 per cent. of the piston area in square feet, multiplied by the highest average speed of the piston.

The free area of the gases which must be passed through the superheater to obtain a certain degree of superheat, together with the superheating surface, depend on the temperature of the gases entering the superheater, and hence these factors are different for the various types of superheaters. The chief thing which the designer has to do, is to determine these dimensions in such a way that the gases are used in the superheater as efficiently as they would be in the evaporative part of the boiler, or, in other words, so that the temperature of the gases which leave the superheater shall not be higher than that of the gases leaving the ordinary tubes. Care must also be taken that, by the application of a smoke-tube superheater, neither the total heating surface of the boiler nor the total free area of the gases is reduced. It will be understood that these conditions can only be fulfilled if the respective diameters of the big smoke-tubes and superheating tubes are in the right relation to the diameter of the ordinary small flues of the boiler.

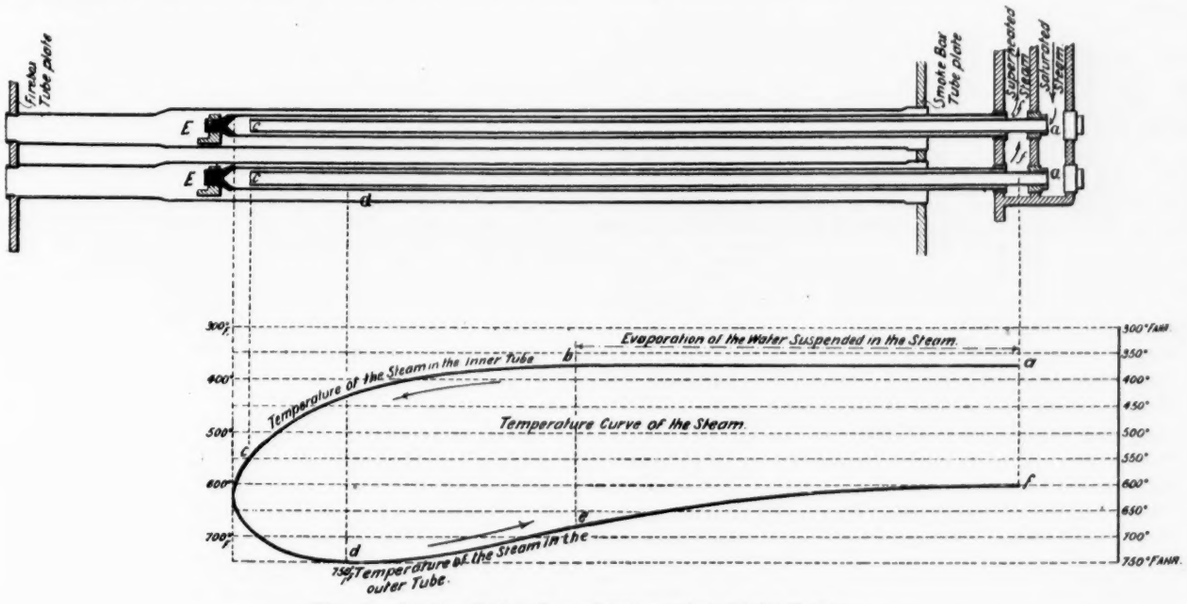


Fig. 6—Smoke Tube Superheater with Field Tubes.

After the diameters of the smoke-tubes and superheating tubes have thus been settled, the question arises, how much of the total tube heating surface of the boiler has to be put in a superheater of the smoke-tube type in order to obtain a certain degree of superheat? For example, in the case of steam of 170 lbs. per sq. in. pressure, and superheats of 100 deg. F. and 200 deg. F., respectively:

The average specific heat of steam superheated by 100 deg. F. is $c_p = 0.58$, and of steam superheated by 200 deg. F. is $c_p = 0.54$.

Assuming an average humidity of the boiler steam of 5 per

cent., which for ordinary locomotive work is certainly not excessive, then the heat to be furnished by the boiler and the superheater, respectively, for the generation of each pound of superheated steam, will be as follows:

(*a*.) By the boiler-heating surface (firebox and smoke-tubes)—

0.95 lb. of dry steam.. $0.95 \times 1196.3 = 1136.5$ B.t.u.
0.05 lb. of water of 375 deg. F. ..... $0.05 \times 348.1 = 17.4$
1153.9 B.t.u.

(*b*.) By the superheater—

To evaporate 0.05 lb. of water of 375 deg. F.—
$0.05 \times 848.2 = 44.4$ B.t.u.
To superheat 1 lb. of dry steam by 100 deg. F.—
$100 \times 0.58 = 58.0$ B.t.u., $44.4 + 58.0 = 102.4$ B.t.u.
To superheat 1 lb. of dry steam by 200 deg. F.—
$200 \times 0.54 = 108.0$ B.t.u., $44.4 + 108.0 = 152.4$ B.t.u.

The total heat required for the generation of 1 lb. of steam of 100 deg. F. superheat $= 1153.9 \times 102.4 = 1256.3$ B.t.u. of which $\frac{102.4}{1256.3} \times 100 = 8.1$ per cent., has to be transmitted by the superheating surface.

The total heat required for the generation of 1 lb. of steam of 200 deg. F. superheat $= 1153.9 + 152.4 = 1306.3$ B.t.u., of which $\frac{152.4}{1306.3} \times 100 = 11.7$ has to be transmitted by the superheating surface.

In ordinary locomotive boilers with narrow and deep fireboxes, about 40 per cent. of the total heat transmission is effected by the firebox, and only 60 per cent. by the flues. Since by the application of a smoke-tube superheater the evaporative power of the firebox remains unchanged, the superheating surface must therefore be: $\frac{8.1}{60} \times 100 = 13.5$ per cent. of the total tube heating surface in the case of 100 deg. F. superheat, $\frac{11.7}{60} \times 100 = 19.5$ per cent. of the total tube heating surface in the case of 200 deg. F. superheat.

When further it is considered that the best part of the tube heating surface near the firebox is unavailable for superheating purposes on account of the high temperature of the gases, the figures have still to be increased by about 25 per cent., so that for a superheat of 100 deg. F. about 18 per cent. of the tube heating surface of the boiler is required.
" " " 200 deg. F. " 25 " "

Obviously the superheating surface does not increase proportionally to the degree of superheat. A large part of the work of a superheater, especially in locomotive work, always consists in the evaporation of the water carried over into the superheater by the boiler steam, and this part of the work is the same, whether the steam has to be superheated 100 deg. F. or 200 deg. F. Therefore the superheater which has to produce a superheat of 100 deg. F. must be more than half the size of the superheater which produces 200 deg. F. superheat.

Although the above considerations apply chiefly to a special system of superheating, they can easily serve as a basis for the calculation of other superheating arrangements.

BOILER EFFICIENCY AND BOILER CAPACITY.

From the point of view of boiler efficiency it is immaterial whether a part of the heat generated by the fuel is used to evaporate water or to superheat steam, provided that the temperature, quality, and quantity of both the furnace gases and the smoke-box gases remain unchanged. These conditions can be fulfilled in smoke-tube superheaters when the respective diameters of the superheating tubes and smoke-tubes are properly proportioned.

The thermal efficiency of the superheater itself cannot be determined, as the humidity of the steam entering the superheater is variable and unknown and thus the amount of heat transmitted by the superheating surface alone cannot be calculated. But the total efficiency of the boiler and superheater, *i.e.*, the relation of the heat utilized in both boiler and superheater to the total heat developed in the furnace, can be easily calculated, when the amount and the temperature of the generated steam are known. In a series of trials made with superheated steam locomotives Mr. Garbe found an average boiler efficiency of about 65 per cent., or even more than is obtainable with ordinary saturated steam boilers. This increase in boiler efficiency can be very simply explained. On account of the saving in water and coal, the superheated steam boiler does not require to be forced to the same extent as an ordinary boiler of the same size would have to be for the same amount of work. The combustion in the superheated steam locomotive takes place, therefore, under more economical conditions. Thus the objection frequently made to superheating, namely, that the saving obtained by the economical working of the superheated steam in the cylinders is partly off-set by the wasteful action of the boiler, is untenable.

A further objection, frequently heard, is that by the application of a smoke-tube superheater the steaming capacity of the boiler is reduced. As a matter of fact, just the opposite is the case.

(To be continued.)

ACCIDENT BULLETIN No. 27.

The Interstate Commerce Commission has issued Accident Bulletin No. 27, containing its record of railroad accidents in the United States during the three months ending March 31, 1908. The number of persons killed in train accidents was 125, and of injured 2,770. Accidents of other kinds bring the total number of casualties up to 15,441 (728 killed and 14,713 injured). These reports deal only with (*a*) passengers and (*b*) employees on duty:

TABLE No. 1.—*Summary of Casualties to Persons.*

	Passengers		Employees		Tot'l persons reported	
	Kil'd.	Inj'd.	Kil'd.	Inj'd.	Kil'd.	Inj'd.
Collisions	10	696	52	641	62	1,337
Derailments	11	703	41	415	52	1,118
Miscellaneous train accidents, includ'g locomotive-boiler explos'n	..	21	11	294	11	315
Total train accidents	21	1,420	104	1,350	125	2,770
Coupling or uncoupling	..	.....	44	633	44	633
While doing other work about trains or while at'ding switches	..	.....	44	3,559	44	3,559
Coming in contact with overhead bridges, structures at side of track, etc.	1	2	22	260	23	262
Falling from cars or engines or while getting on or off	33	574	127	2,736	160	3,310
Other causes	17	561	315	3,618	332	4,179
Total (other than train)	51	1,137	552	10,806	603	11,943
Total, all classes	72	2,557	656	12,156	728	14,713

The total number of casualties to passengers and employees reported in the quarter under review (15,441) is smaller than in any quarter since that ending with March, 1905; the total number of passengers and employees killed by all causes (last item in Table No. 1*a*) is smaller than in any quarter since June, 1904, and the total killed in train accidents (125) is smaller than in any quarter since the monthly records were established, in July, 1901. The number of employees killed in coupling accidents (44) is smaller than in any quarter since June, 1902. These gratifying reductions in the lists of deaths and injuries are all due primarily to the reduction in the volume of traffic on practically all of the railroads of the country. The condition was indicated, though in a lesser degree, in the last bulletin. Reduced traffic has resulted also in easier work and shorter hours.

The following table (No. 1*a*) shows the usual comparisons with the last preceding bulletin and with one year back, and below it is a list showing the totals of passengers and em-

ployees killed in train accidents, each quarter, since the monthly records were established:

TABLE 1*a*.—*Comparisons of Principal Items.*

	Bulletins		
	No. 27.	No. 26.	No. 23.
1. Passengers killed in train accidents	21	21	126
2. Passengers killed, all causes	72	81	184
3. Employees killed in train accidents	104	199	295
4. Employees killed in coupling	44	77	62
5. Employees killed, all causes	656	1,011	1,109
6. Total passengers and employees, all causes	728	1,092	1,293

Passengers and Employees Killed in Train Accidents.

Bulletin No. 27	125	Bulletin No. 13	411
" " 26	220	" " 12	167
" " 25	346	" " 11	221
" " 24	250	" " 10	446
" " 23	421	" " 9	280
" " 22	474	" " 8	230
" " 21	267	" " 7	300
" " 20	194	" " 6	266
" " 19	274	" " 5	263
" " 18	320	" " 4	140
" " 17	272	" " 3	212
" " 16	262	" " 2	272
" " 15	232	" " 1	240
" " 14	242		

The total number of collisions and derailments in the quarter now under review was 2,632, as follows:

TABLE No. 2.—*Collisions and Derailments.*

	No.	Loss.	Persons Killed.	Persons Injured.
Collisions, rear	235	$188,731	12	271
" butting	153	231,394	22	418
" train separating	78	31,108	2	38
" miscellaneous	724	335,047	26	610
Total	1,190	$786,280	62	1,337
Derailments due to:				
Defects of roadway, etc.	331	$210,255	13	382
" " equipment	580	498,429	6	143
Negligence of trainmen, signalmen, etc.	75	44,195	3	63
Unforeseen obstruction of track, etc.	87	103,102	7	92
Malicious obstruction track, etc.	24	29,470	4	48
Miscellaneous causes	345	305,688	19	390
Total	1,442	$1,191,139	52	1,118
Total collisions and derailmts	2,632	$1,977,419	114	2,455
Total for same quarter of 1907	3,991	$3,536,110	355	4,459

Following is the usual list of Class A train accidents—all in which the damage is reported at $10,000 or over; notable cases in which passengers are killed and those doing damage less than $10,000 and down to $2,000, wherever the circumstances or the cause may be of particular interest.

TABLE 2*a*.—*Causes of Twenty-six Prominent Train Accidents (Class A).*

[NOTE.—R. stands for rear collision; B., butting collision; M., miscellaneous collisions; D., derailment; P., passenger train; F., freight and miscellaneous trains.]

Collisions.

No.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars & roadway.	Reference to record.	Cause.
1	R.	F. & F.	0	0	$1,467	19	False clear manual block signal. Operator's experience 4 years. This operator says that when the train approached he "was working on his books and unconsciously pulled" off the signal without consulting the block sheet.
2	B.	F. & F.	1	3	3,075	51	Operator failed to deliver meeting order; also train ran past an automatic block signal set against it.
3	B.	P. & F.	2	13	4,500	3	Mistake in despatcher's order. (See note in text.)
4	R.	F. & F.	0	0	5,000	1	Air brakes inoperative: angle cock on front end of first car partly closed; cause not discovered. At the last station where the air brakes should have been tested, the duty was neglected.
5	M.	F. & F.	1	1	5,000	56	Northbound train ran past switch at end of double track. (See note in text.)
6	R.	P. & F.	2	23	6,400	22	Extra passenger train (11 p.m.) ran past distant and home automatic block signals; dense fog.
7	M.	P. & P.	8	17	8,000	26	Careless management of street car at crossing. (See note in text.)
8	B.	F. & F.	0	7	9,220	4	Conductor and engineman misread names of station in meeting order. Conductor in service 8 months.
9	B.	F. & F.	0	0	10,250	5	Engineman of empty engine overlooked meeting order.
10	B.	P. & F.	1	20	11,852	46	Conductor and engineman of northbound passenger train overlooked meeting order; engineman also ran past automatic block signal set against him.
11	B.	F. & F.	0	4	14,914	53	Misunderstanding between conductors of westbound and eastbound trains as to the station for meeting the second part of a separated train. (See note in text.)
12	B.	F. & F.	5	2	18,600	30	Mistake in despatcher's order. Operator, 2 years in service, omitted the word "East" from the name of the meeting station, though in repeating the order back to the despatcher he had given name correctly.
13	B.	P. & F.	1	13	21,000	27	Mistake in despatcher's order, the forms of the orders being substantially as follows: The order read "Run from A to C. Meet 7 at B." It was written out and delivered, "Run from A to C. Meet 7 at C." The operator had had 5 years' experience and is reported as having a very good record.
Total			21	103	$119,278		

Derailments.

1	D.	P.	1	23	$1,310	68	Accidental obstruction.
2	D.	P.	3	28	3,400	30	Broken rail; speed 18 miles an hour. Rail weighing 56 lbs. per yard; made in 1883.
3	D.	P.	2	43	4,795	43	Bolts in track been loosened by derailment of an engine 9 hrs. before; defect in track had not been discovered. Rails partly covered by snow.
4	D.	P.	0	15	6,580	31	Unexplained; speed 45 miles an hour. Driving wheels of locomotive first to leave track.
5	D.	P.	0	0	11,400	33	Broken wheel; station building knocked down and fire started from station stove destroyed building and 3 cars. Wheel, pressed steel, 1 year old. Had been turned once. There was a well-defined "pipe" in the metal.
6	D.	F.	0	0	11,400	57	Bridge fell under coal train. Wooden Howe truss 150-ft. span. Reported in good condition. Believed clamps had been broken in consequence of severe application of brakes.
7	D.	P.	2	2	11,600	67	Malicious obstruction. (2-in. hexagonal nut on rail, on outside of curve, engine and one car broke through bridge 28 ft. high.
8	D.	P.	1	68	11,630	38	Broken 80-lb. rail.
9	D.	F.	0	0	14,000	10	Broken wheel.
10	D.	F.	0	0	14,800	61	Brake rod dropped on track, having become loosened by the working out of key bolt.
11	D.	P.	0	5	21,900	45	Soft roadbed; speed (1 a.m.) 18 miles an hour. Damage due largely to fire from Baker heater in sleeping car 3 hrs. after derailment. Sleeping car was not owned by the railroad company, and its conductor had given assurance that there was no fire in the car.
12	D.	F.	0	1	28,700	63	Broken wheel; wheel cast iron, 33 in. in diameter, 8 years old. Flaw had existed some time.
13	D.	P.	3	87	46,000	14	Unexplained. Speed, 25 miles an hour on curve of 6 deg. Grade 1 per cent. descending. Part of train fell through trestle bridge and bridge was wrecked.
Total			12	272	$187,515		
Grand total			33	375	$306,793		

Collision No. 3 was due to the mistake of a telegraph operator in writing out a meeting order. The order, as recorded in the despatcher's office, named "12:15" as the time at which a certain train must be at a certain station, but the operator, in writing the order for delivery, wrote "12:50." Two or three operators, who were listening at the time, testified that the order was transmitted over the wire as recorded by the despatcher, namely, "12:15"; and the report indicates the belief on the part of the Superintendent that the station operator, not being satisfied with the copy which he had made, rewrote the whole order, and, in rewriting, made the mistake. The collision occurred about 12:30 a.m. The station operator had been on duty since 8 p.m., and had worked nearly

all the preceding day at another station. At this other station he went on duty at 7 a.m., was relieved at 3.30 p.m., and then went to the station where the error occurred. The despatcher who ordered the operator from one station to the other did not know that he had been on duty during the day, but appears to have understood that he had been relieved at that station in the morning.

Collision No. 5 occurred at end of double track. A train running from double to single track fouled the switch just as a train from the opposite direction came along. The collision occurred just after sundown. It was due to the fact that the double track had been extended and the engineman not informed of the fact. The switches had been moved about 1,500 ft., and the tower containing the telegraph office had also been moved; and the engineman regulated, or attempted to regulate, the speed of his train with reference to the location of the signal light on the tower. Besides running 1,500 ft. farther than he was accustomed to running, he passed a cross-over track, which had been put in at the former location of the tower. He asserted that he did not notice the switch at this cross over.

The fireman, as well as the engineman, of this train is held blameworthy, because he did not inform the engineman that the engine was fouling the single track, the view of the track being better from the fireman's than from the engineman's side of the engine.

The ignorance of the engineman concerning the change in the location of the switches and tower was due to the omission of himself and the conductor to read a telegraphic bulletin which had been issued at a station 16 miles back. The operator at this station had three bulletins for these men to read and sign. Two of the bulletins were properly read and receipted for, but the other was neglected and the operator did not notice this neglect. Thereafter the operator, in gross disregard of rules, sent to the despatcher the names of the conductor and engineman as having been signed to the overlooked bulletin, although they had not signed it.

All these men had had ample experience in their respective departments. The men in charge of the train had been on duty 13 hours and 50 minutes.

Collision No. 7, fatally injuring eight passengers in an electric car, occurred at a street crossing where two standard (steam) railroads are crossed by a street, which is traversed by an interurban electric line. The two standard railroads lie parallel to each other, about 65 ft. apart and the direction of their lines is north and south; the direction of the street is east and west. This double crossing has gates with an attendant, such as are generally used at grade crossings of streets over railroads, and two electric alarm bells, one at each railroad. On the day when this collision occurred the gates were out of order because the pneumatic pipes, by means of which they are operated, and which lie underground, had been ruptured in consequence of moisture freezing in one of them, and the attendant at the crossing gave his signals with a yellow flag in the day time and a yellow lantern at night. The electric alarm bells are reported as in good working order at the time of the accident. The bell at the track on which the accident occurred rings from the time an approaching train is within 2,000 ft. of the crossing until it has passed the crossing. The regulations of the electric line require that the cars shall stop before crossing the steam railroad, and that the conductor shall go ahead on foot and assure himself that no steam railroad train is approaching, before the electric car passes over the crossing.

This collision occurred at 8.03 p.m., and the night was quite dark.

According to the report of the company operating the electric car, the conductor of that car went across both steam railroads with a red lantern in his hand; he saw no train coming and signaled to the motorman to proceed, but before the car had reached the first of the steam railroad tracks the conductor saw a train approaching rapidly on the second railroad and signaled to the motorman to stop, but it was then too late to avoid the collision. The electric car was struck in the middle and completely demolished.

According to the report of the steam railroad, the conductor of the electric car gave the proceed signal to his motorman before crossing the second railroad; and when he gave the signal the crossing watchman called to him that a train was coming. Both watchman and conductor then signaled the motorman to stop, but the motorman disregarded these signals.

Collision No. 11 was between a part of a westbound extra freight train, drawn by two engines, and a regular eastbound train. One of the engines and a part of the cars of the westbound train were sent forward from B to C and at C met the eastbound train. The two brakemen in charge of the part of the westbound train gave some information to the conductor of the eastbound concerning the point at which he was to meet the second part of the westbound train, and the eastbound proceeded; but the information was inaccurate or insufficient, and the conductor of the westbound, having one engine and the rear portion of his train, started from B before the eastbound reached there, and his train collided with the eastbound.

The bulletin contains the usual tables of details of injuries to employees.

TELEPHONE TRAIN DESPATCHING AND SAFETY STOP DEVICE ON THE BURLINGTON, INSPECTED.

The joint committee of the American Railway Association on interlocking and block signals, which is made up of the committees on train rules and safety appliances respectively, with F. C. Rice, of the Burlington, as chairman, were taken by Mr. Rice on the 17th, following a meeting in Chicago on the 16th inst., to inspect the Burlington's system of train despatching by telephone, and the safety stop device installed on that line for trial at the request of the Interstate Commerce Commission.

The party was taken to Aurora, 30 miles from Chicago, by special train, where special facilities had been provided for the train despatching demonstration. A report on this system read by W. W. Ryder, Superintendent of Telegraph of the Burlington, before the Association of Railway Telegraph Superintendents at Montreal, Que., June 24, was reprinted in our issue of June 26. The installation of this system on the Burlington is due primarily to the initiative of Daniel Willard, Second Vice-President, and Mr. Ryder has attended to the details.

In the demonstration for the American Railway Association committee, each person was provided with a receiver, enabling all to "listen in" simultaneously as the orders were handled. The statements made in Mr. Ryder's paper regarding speed of handling, distinctness, etc., were well borne out, the opinions of the visiting officers being unanimous upon this point.

After the despatching demonstration the party was taken to the installation of the Rowell-Potter Safety Stop Co., a short distance east of Aurora. The work of installing the devices was not quite finished, and had been hurried somewhat in order to make the demonstration for the committee. The Rowell-Potter device is known to railroad officers, the first patents having been taken out some years ago, and experimental installations made from time to time on roads as improvements have been made and additional patents granted. The present installation, as already noted, has been placed on the Burlington at the request of the Interstate Commerce Commission for its Block Signal and Train Control Board, which is investigating the subject of automatic train stops. Similar installations of other safety stop and train control devices are being made on other roads and the Board will investigate and report on them when they are in readiness.

ECONOMICAL CARE OF MATERIAL.

BY FRANK H. CRUMP,
Assistant to Auditor; San Pedro, Los Angeles & Salt Lake.

The economical care of material is of vital importance and the officer in charge of material should know the quantity and value of each article on hand, its use, dimensions, weight, etc., etc., and also the *average monthly issue* of each. Ordinarily the quantity and value of material on hand cannot be ascertained without the expense of an inventory, requiring from 60 to 90 days, and this is of little value without the average monthly issues, which may be used as a basis of economical replenishment.

In order to ascertain the average monthly issues it is necessary to adopt a method of identifying the material with the requisition.

Numbers on Department Requisitions.—The first thing necessary is to assign a number to each department using material, and to require this number to be used in connection with the requisition number, beginning with number 1 each year, as for example: a department to which has been assigned Number 10 would number its requisitions 10-1, 10-2, 10-3, etc. Requisitions should be made in triplicate; original sent to the general storekeeper, duplicate to the person to whom the material is to be shipped, and triplicate kept for file. The right-hand margin of the original should be ruled and headed to suit the needs of the general storekeeper; the duplicate for the data necessary to be kept by the person receiving the material, and the triplicate for the data required by the one making the requisition.

Numbers on Store Invoices.—Store invoices to cover the value of material furnished on department requisitions should be given the same number as the requisitions. For example: If department number 10 makes requisition number 10-40, the store invoice covering the cost of such material should be numbered 10-40. Store invoices should also be made in triplicate and provision made on each for showing the information required by the person for whom it is intended.

Numbers on General Storekeeper's Requisitions.—General storekeeper's requisitions on the purchasing agent to cover material not in stock should bear the department requisition number. For example: If department number 10 makes requisition number 10-40, the general storekeeper's requisition on the purchasing agent would be numbered 10-40. General storekeeper's requisitions should be made in triplicate; original sent to the purchasing agent, duplicate to the party making the requisition, and triplicate kept for file, and each form should provide spaces on the right-hand margin for the needs of the department for which it is intended.

Numbers on Purchasing Agent's Orders.—The purchasing agent's order for the material covered by general storekeeper's requisition number 10-40 should also be numbered 10-40; duplicate furnished the general storekeeper, triplicate to the department making the requisition, and quadruplicate kept for file.

Numbers on Shipper's Invoice.—Shipper's invoice should refer to the order number 10-40 (the requisition number being the same as the order number.)

Number on Goods Shipped.—The goods when shipped should also be marked 10-40 by the party from whom purchased. The department receiving the goods can thus identify the goods with the requisition. The department requisition number thus follows the transaction from the time the material is ordered until received, and only one number is used, instead of a multiplicity of numbers, none of which is of value as reference without the others. Each step in the process of obtaining the material is known by the department which ordered it, and by the general storekeeper, as well as the purchasing agent. This prevents errors and avoids tracing.

Numbers Assigned Each Article.—The next step is to adopt a standard list of stock material, arranged in alphabetical order, by classes, to each of which a number should be assigned. The list below, while incomplete, will serve to illustrate the method.

Class No.	Class name.	Class No.	Class name.
1.	Air-brake material.	39.	Lumber—Oak.
2.	Axles—car and tender.	40.	Lumber—Oregon pine.
3.	Axles—engine and driving.	41.	Lumber—Pine, sugar.
4.	Bearings—journal.	42.	Lumber—Pine, white.
5.	Boiler tubes.	43.	Lumber—Poplar.
6.	Bolsters.	44.	Lumber—Redwood.
7.	Bolts.	45.	Lumber—Miscellaneous.
8.	Brake-beams.	46.	Metals.
9.	Bushings.	48.	Nipples.
10.	Car furniture.	49.	Nuts.
11	Car heating and lighting material.	50.	Oils.
		51.	Packing material.
12.	Castings—Brass.	52.	Paints.
13.	Castings—Bronze.	53.	Piles.
14.	Castings—Iron.	54.	Pipe.
15.	Castings—Steel.	55.	Pintsch Gas material.
16.	Couplers.	56.	Plugs.
17.	Couplings.	57.	Rail.
18.	Elbows.	58.	Rail fastenings.
19.	Electric Fixtures.	59.	Ranges, steam.
20.	Fence posts.	60.	Reducers.
21.	Fence wire.	61.	Rivets.
22.	Flues.	62.	Scrap.
23.	Forgings.	63.	Screws.
24.	Frogs.	64.	Springs.
25.	Fuel.	65.	Steam shovel material.
26.	Glass.	66.	Steel.
27.	Hand cars.	67.	Switch ties.
28.	Hardware.	68.	Ties.
29.	Headlight material.	69.	Tools.
30.	Hose.	70.	Trucks, etc.
31.	Injectors.	71.	Unions.
32.	Interlockers.	72.	Valves.
33.	Iron—Bar.	73.	Velocipedes.
34.	Iron—Sheet.	74.	Washers.
35.	Lighting material.	75.	Waste.
36.	Locomotive parts.	76.	Wheels, car.
37.	Lubricating material.	77.	Wheels, locomotive.
38	Lumber—Ash.	78.	Wheels and axles.

Each article under each of these classes should be numbered beginning with number "1." For example:

Class 7. Bolts.

7—1.	Bolts, carriage	¼ x 1
7—2.	" "	¼ x 1¼
7—3.	" "	¼ x 1½

Class 33. Iron, bar, flat.

33—1.	Iron, flat	¼ x ¾
33—2.	" "	¼ x ⅞
33—3.	" "	¼ x 1

The number and the name should be printed, stamped or written on tags, and placed over each bin; stenciled on large articles, or placed on bulletin boards in proximity to the articles. If an article has no number it is not of record, and all articles with numbers may be readily identified by the number.

Material should be arranged in store as far as possible by classes and article numbers. The numbers then indicate the position of the material in the store.

General Storekeeper's Classified Record of Material.—The general storekeeper should be provided with a loose leaf record of the material at each store, which should show quantity and value of material ordered, received, issued and on hand *each month*. This may be done by providing a wide sheet for the numbers and names of articles, and a narrow sheet for each month's account. Sheets should be bound on the right-hand margin and notched on the left-hand margin to show class number and article number. This record should remain in the general storekeeper's office, and he should send to the auditor only the total by classes.

A copy of the standard list of material should be furnished to each department using material and the article number, as well as the name, used on all requisitions, a column being provided for this purpose.

On Shop Requisitions the Article Number Only Should be Used.—Foremen of shops should be furnished with loose leaf blue prints, containing numbers and names of such articles as they use, and the use of the number only will save clerical labor. Bulletin boards should be provided for blue prints in shops and roundhouses. They should be posted in conspicuous positions, where they can be readily referred to by the persons using the material. This will save the foreman much valuable time.

The general storekeeper's requisitions on the Purchasing Agent should give the number as well as the name of the article, which should in turn be used by the Purchasing Agent on orders. Request should be made of shippers to use the article numbers on their invoices.

Material Received.—Invoices covering material received

each month should be distributed by article numbers, on working sheets, and the total quantity and value of each article entered in the stock record in column provided for "Material Received," using adding and listing machine.

Material Issued.—Quantity and value of material issued should be distributed on working sheets, first by departments and accounts, and then article numbers, and entered on the record of material in the column provided, using an adding and listing machine.

Copies.—A carbon of the recapitulations should be furnished to each department, and each may then ascertain the value of the material furnished. Mechanical department distributions should be made by engine numbers, car numbers, shop order numbers, etc. It is then possible for the master mechanic to ascertain the quantity and value of each article charged to each engine or car and there is no duplication of labor to ascertain this information.

Numbers on Drawings.—Article numbers of material should be shown on all blue prints, drawings, patterns, etc. Material may then be ordered by article number, and this will be of great assistance in securing the proper material. Article numbers should also be cast into castings and thus avoid the use of all other numbers.

Price Book.—The store classified record of material is also a price book and instant reference can be made to any article and its price ascertained. No other price book is necessary. The average price is used instead of the current price, which avoids the adjustment of values which is required under other methods.

Record of Material Ordered.—Provision is also made on the monthly sheets for showing material ordered and date received. The general storekeeper then is in position at all times to know what stock is on hand, what has been ordered, and what should be ordered. The same method should be used on track material. The class number should be stenciled on rails, ties, switch stands, frogs, etc. This will avoid the constant measurements which are necessary under present methods and will also insure receipt of proper material when inexperienced men are employed.

Inventory Cards.—This system may be installed at any store at any time by placing cards in each bin to show the amount on hand and providing space for adding material received and issued *up to the time the classified record is begun.* Cards may then all be removed, assorted and entered on the record, priced and extended.

Article Numbers to Indicate Cost.—The article numbers may be further utilized by listing all parts of a certain class of engines or cars together in proper order and assigning a class number to it, giving each article under each class a number, beginning with number 1. For example: Supplies carried in cabooses, supplies on passenger trains, section tools, shop tools, etc. Material for any work may be thus numbered and the distribution by numbers assembles the charges for this particular work.

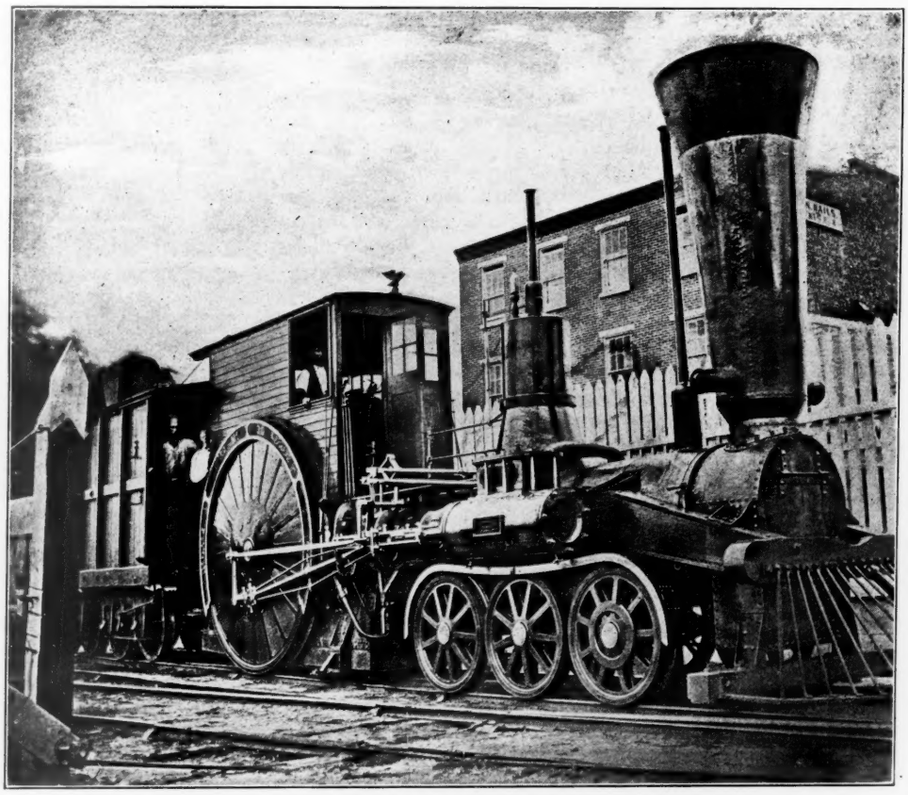
The practicability and efficiency of this system has been thoroughly tested and the economies possible are many and far-reaching.

EVOLUTION OF THE LOCOMOTIVE TRUCK.

BY S. A. BULLOCK, BALDWIN LOCOMOTIVE WORKS.

Wood, cast iron, wrought iron and steel are materials from which wheels have been made. The wheel could never have reached its high development had the track remained in its primative state. As greater loads were carried, the wheel was made stronger and the rail heavier. To-day we have steel rails weighing 100 lbs. per yard, sustaining a load of 25,000 lbs. per wheel.

About the middle of the eighteenth century the first cast iron wheels were used on trucks for the Newcastle coal mines. The axles were made of wrought iron, square on the ends to fit the nave of the wheel. Up to this time rails were made of wood, cast iron or wrought iron. The malleable iron rail was introduced about 1805. Nicolas Wood, in his "Practical Treatise on Rail Roads," published in London in 1825, makes the following statement:



Norris Locomotive, with Six-Wheel Truck.

"About twenty years ago (i. e., 1805) malleable iron rails were tried at Wallbottle Colliery, near Newcastle-upon-Tyne, by Mr. C. Nixon; the rails were 1 in. square bars, they were joined together by a half lap joint, and with one pin of the rail projecting beyond the end of the adjoining one, two or three inches."

In 1820, the section of the malleable iron rail was changed from the square to the inverted pear shape, the depth of the rail increasing from the ends to the center, thus forming a beam of uniform strength. Locomotive engines were run on these rails at a maximum speed of six miles an hour. Mr. Wood concludes his treatise with this remark:

"That so long as the expense of one locomotive engine does not exceed that of four horses and their attendance, then goods can be conveyed with the same expenditure of motive power at six miles an hour upon a railroad, that they can be conveyed at two miles an hour upon a canal."

In 1825 Wm. T. James patented a railroad wheel with its tread formed in steps of different diameters. About this time the cone-tread wheel was used, which enabled wheels to easily take the curves.

In 1812, William Chapman, an English civil engineer, patented a four-wheel swivelling truck, which, by the pitmen, was nicknamed the "bogie." In 1832, the swivelling truck was used by Jacob Rupp, foreman of the Baltimore & Ohio Railroad. Stevenson's locomotive, the "Rocket," built in 1829, had a large driver in front and a trailing truck behind the boiler. In 1830, this engine was rebuilt with underhung truck springs. On November 23, 1832, Matthias W. Baldwin finished his first locomotive, "Old Ironsides," for the Germantown railroad. This locomotive had four wheels and weighed, in running order, about five tons. The front ones were simply carrying wheels, which formed the rigid truck. The wheels were made with heavy cast iron hubs, wooden spokes and rims, and wrought iron tires.

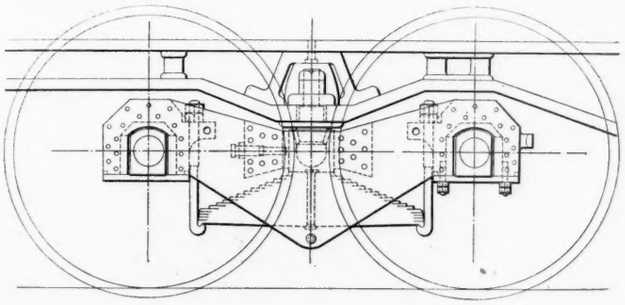


Fig. 1.

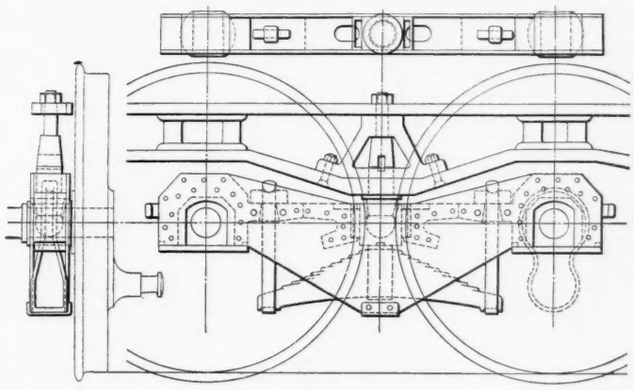


Fig. 2.

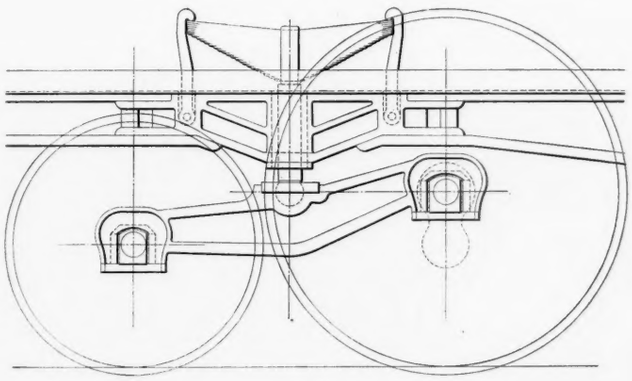


Fig. 3.

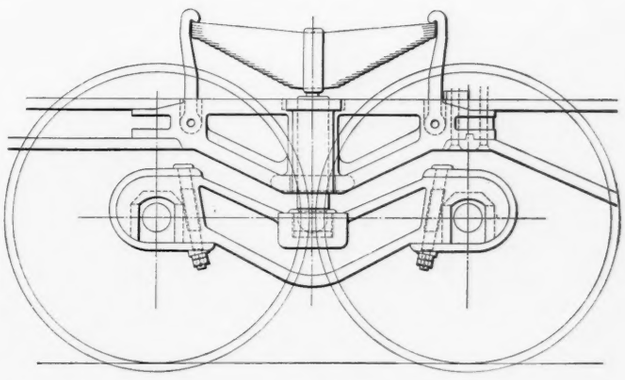
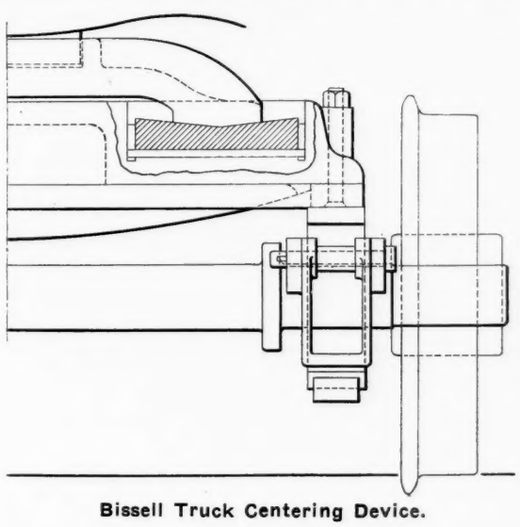


Fig. 4.

Designs of Early Engine Trucks.

In 1842, Mr. Baldwin produced his flexible truck, as shown in Fig. 1, the object being to couple the truck wheels with the driving wheels, thus increasing the tractive power. The front truck wheels must, therefore, be coupled and at the same time allow the engine truck a free radial motion which was accomplished by making the boxes cylindrical, as shown in Fig. 2. This truck, although ingenious, was not a success, since the parallel axles of the front truck were not parallel to the radius of the curve, and a consequently flange wear was the result. The versatility of this designer is without question. In comparing Figs. 1, 2, 3 and 4, we see that the truck springs were changed from under-hung springs with hooks, to under-hung springs with straps, then to the over-hung springs. The truck shown in Fig. 3 has large and small wheels; the large ones, acting as drivers, were connected by side rods to the drivers.



Bissell Truck Centering Device.

The old Norris locomotive, shown in the illustration, had two large drivers and six truck wheels. This engine was built for the Camden & Amboy Railroad, now a part of the Pennsylvania. The boiler was so arranged as to slope down in the rear and it was fired through an opening in the slope back, below the driving axle. Most of the weight of this locomotive was carried by the truck itself, and as a result the engine failed when more than one car was put behind it, since it lacked adhesive power.

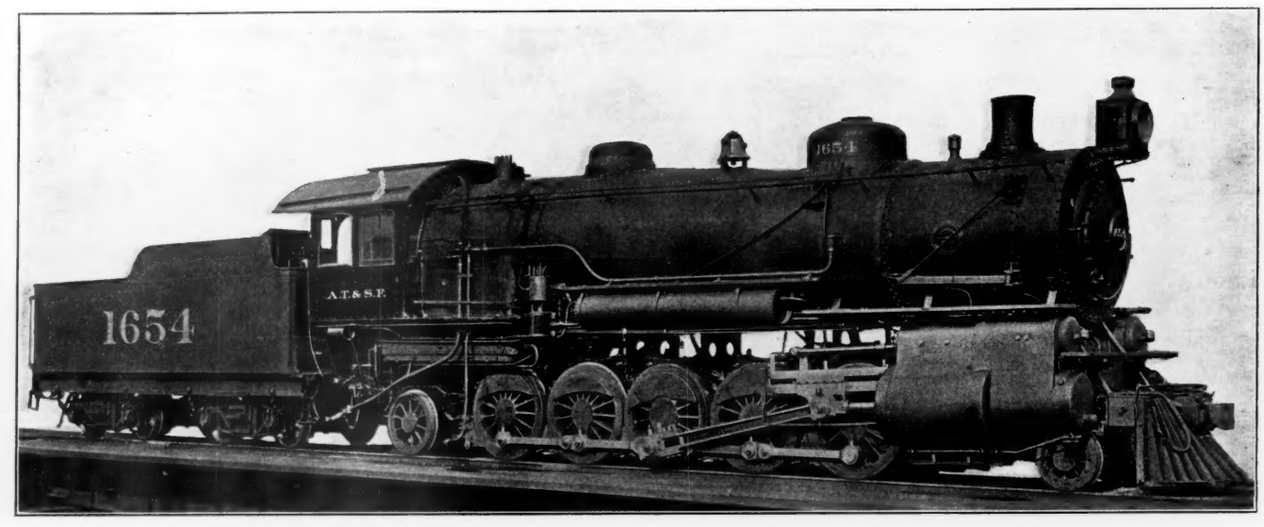
Mr. Colburn, in his "Locomotive Engineering," published in London, in 1871, stated that:

"The American truck is always provided with a peculiar arrangement, permitting of easy lateral motion of the carriage upon its support. This is known as the swing-beam. The pivot is formed and the load supported not directly upon the frame of the truck, but upon the bolster, which is hung from the truck frame by means of long links, free to swing in a direction at right angles to the length of the carriage. The center bearing is not the ball and socket, once employed and still retained in certain English engines, but is formed upon a flat annular seat of about 12 inches diameter and with this there is no rocking motion."

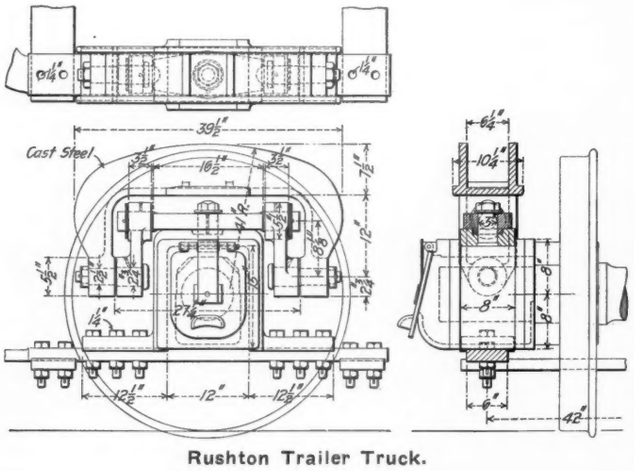
In this "swing-beam" or "swing-link" truck it is interesting to note the various angles at which these links were hung by different locomotive builders. One would insist upon having the links wider apart, center to center, at the bottom, than

at the top; another would desire the reverse condition, and others would hang the links parallel. In our opinion, swing-links should be parallel, for it requires practically the same amount of force to move the parallel links out of their central position, as would be required to move the non-parallel links; also, the parallel links throughout their entire swing keep the center plate parallel, which is not the case with links that are hung on an angle. About 1853 there was built for the Pittsburgh, Fort Wayne & Chicago Railroad a four-wheel engine truck, having two semi-elliptic springs on boxes inside the wheels and two semi-elliptic springs on boxes outside the wheels. This type of truck is now obsolete.

In 1857, Mr. Bissell made a truck and secured a patent on its peculiar centering device, which consists of side bearings having two inclined planes which form an angle at the center of each bearing. When the engine bearing would move out of its normal position in rounding curves the bearing of the front truck would have to travel up the incline, and when leaving the curve the force of gravity would bring the engine into its original position. There were then modifications of the Bissell truck; roller instead of flat surfaces were used, but the multiplicity of parts was so great that this design was abandoned. Flat coil springs were often placed over the truck boxes. This was in the days of the single bar engine frame, where space was not considered, but when the two-bar engine frame was introduced, the spring had to be placed below the frame and that developed the equalized "pony" truck of to-day.



Atchison Locomotive with Rushton Trailer Truck.



Rushton Trailer Truck.

The Wright truck had the center pin resting in the center plate, which in turn rested on a concave surface of convenient radius. In taking a curve, the center plate would ride up on the curved surface of the truck and in returning to the tangent, the truck, by gravity, would center itself. It was difficult to secure the correct curvature of the bearing in the truck bolster for all curves of the track. At first the four-wheel truck had a radius bar, but the hole in the bar was made so large that with the small radius bar bolt there was ample clearance for radial motion, the bolt and bar acting only as a safety device in case the truck jumped the track.

In 1882 there was built for the Pennsylvania & New York Canal Railroad Co. class 10-34 E 266* engine, a two-wheel, or pony, truck, having the springs of the flat spiral type, four to the truck, two over each box. The springs pressed on the spring seat at the bottom, directly over the spring staple, which rested on the truck box. The spring cap consisted of a flanged inverted U, made of iron and bolted fast to the frame. In 1889 there was built a pony truck, class 10-18 ¼ C 9, having two semi-elliptic springs supporting the center plate and having two countersunk bolts running through the center plate and holding or binding it tight against the springs by means of a cast iron brace under the springs.

J. E. Muhlfeld, in a paper read before the International

*The designation of the different classes of locomotives, as used by the Baldwin Locomotive Works, embodies the combination of certain figures with one of the letters A, B, C, D, E or F, to indicate both the number and kind of wheels and size of cylinders. The method of designating the number of driving wheels by letter was first used in 1842, and has been continued without change since that time. Thus a locomotive having one pair of driving wheels is classed B; that with two pairs, C; that with three pairs, D; that with four pairs, E; and that with five pairs, F. The letter A is used for a special class of high-speed locomotives, with a single pair of driving wheels, and for a similar type used for rackrail service. A figure (4, 6, 8, 10 or 12) is used as an initial figure to indicate the total number of wheels under the locomotive. A figure or figures following the initial figure indicates the diameter of the cylinders, and the figure or figures following the class designation represents the consecutive class number of the locomotive on which it appears. Thus, 8-26 C 500 indicates a locomotive with eight wheels in all, having cylinders 16 in. in diameter, with two pairs of driving wheels, and the five hundredth locomotive of its class.

The number representing the cylinder diameter is an arbitrary figure, originally intended to represent the weight of the locomotive in tons, but in present practice it has no such reference, 40 representing a 23-in. cylinder, 38 a 22-in. cylinder, 36 a 21-in. cylinder, and so on. The size of the cylinder may be found by dividing this number by two and adding three to the quotient, or the figures for cylinder in the class designation may be obtained by subtracting three from the number indicating the diameter of the cylinder in inches and multiplying the remainder by two.

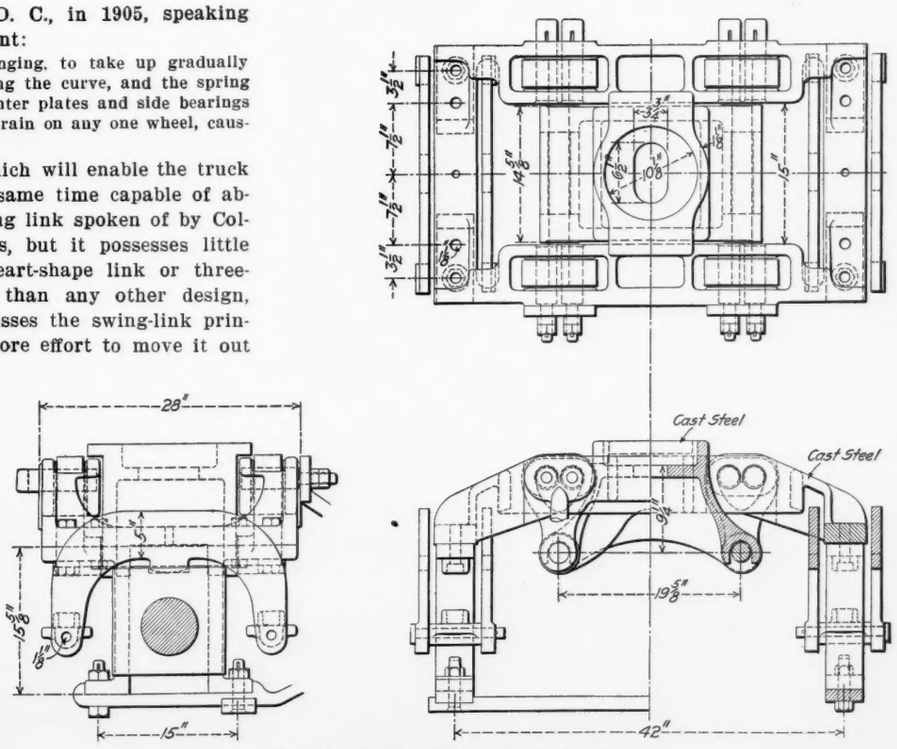
The same rule is carried out in the classification of compound locomotives. In this case, however, a number is given to indicate the diameter of each cylinder, that indicating the high pressure being written over the low pressure. Thus $10^{23}/_{42}$ D 100, indicates a compound locomotive with ten wheels in all, having low pressure cylinders 24 in. in diameter, with three pairs of driving wheels and the one hundredth locomotive of its class.

The addition of the fraction ¼ to any class indicates that there is a truck placed at each end of the locomotive. The addition of the fraction ⅓ to any class indicates that there is no front truck, but that a rear truck is placed back of the firebox.

Railway Congress at Washington, D. C., in 1905, speaking of trucks, made the following statement:

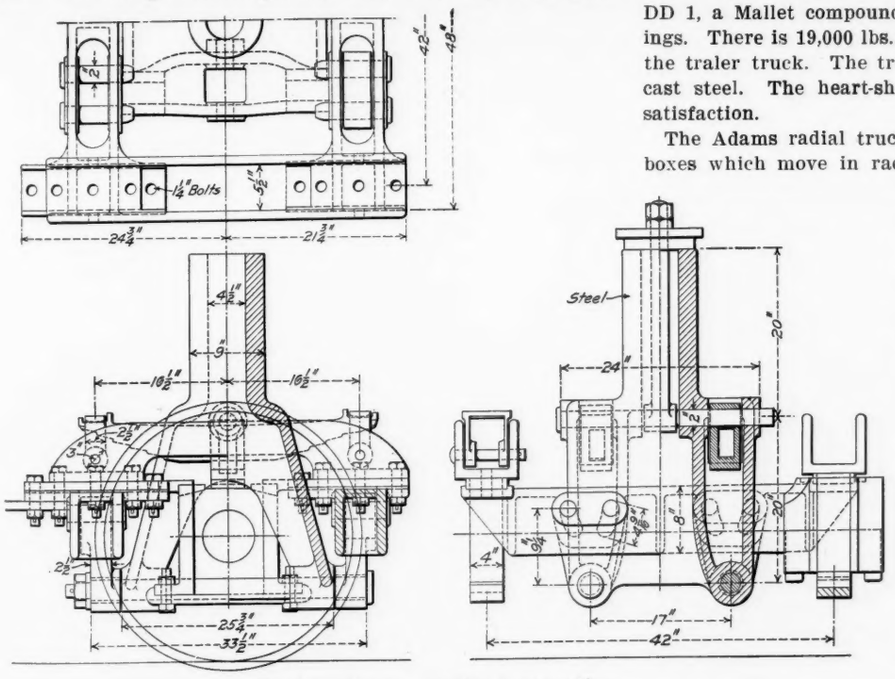
"The truck should be flexible and swinging, to take up gradually the lateral shock transmitted when striking the curve, and the spring rigging should be so equalized and the center plates and side bearings so adjusted, that there will be no undue strain on any one wheel, causing excessive wear or impact of flanges."

What construction can be evolved which will enable the truck to be flexible, swinging, and at the same time capable of absorbing the lateral shock? The swing link spoken of by Colburn fulfills two of these conditions, but it possesses little value as a shock absorber. The heart-shape link or three-point-suspension link, more nearly than any other design, fulfills these requirements. It possesses the swing-link principle, at the same time requiring more effort to move it out of its central position in entering curves, and brings the weight of the engine more quickly into line when leaving the curve. On a short wheel base, if the truck is at a considerable distance from the front driver, then the heart-shape link is most efficient. This type of link steadies the truck, prevents the engine from nosing and minimizes the transverse strain on the engine frame.



Front Truck; Mallet Locomotive.

The engine truck of class 8-14 ¼ C 27 has swing links pivoted from the bottom of the truck bolster. This truck carries all its weight on either side of the center plate, the design being necessarily so on account of the scarcity of space. The two equalizers are applied to the yoke outside of the springs. The truck of class 6-28 C 2, carries 13,300 lbs. The rigid wheel base is 7 ft. 6 in., total engine wheel base 15 ft. 8 in., making a distance from the engine truck wheel to the front driver 8 ft. 2 in. The swing links are parallel and 12 in. long. The truck of class 8-26 ¼ C 5 locomotive sustains 16,560 lbs., equalized on either side of the center pin. The truck of class 8-20 ⅓ C 5 locomotive carries 19,200 lbs., which is transmitted through the swing bolster and swing links to the truck frame, through the two semi-elliptic springs to the equalizers and boxes themselves. The trucks of A. T. & S. F. locomotive, class 14 32/58 ¼ F 140, shown in the accompanying illustration, carry 23,420 lbs. on the front truck and 29,240 lbs. on the trailer truck. The distance from the front engine truck to the front driver is such that the heart-shape links have been successfully adopted. The trailer truck is of the Rushton type, mention of which is made later. The front and trailer trucks of class 16 37/60 ¼ DD 1, a Mallet compound, are shown in accompanying drawings. There is 19,000 lbs. on the front truck and 20,000 lbs. on the traler truck. The trucks are made, to a great extent, of cast steel. The heart-shape links are used and have given satisfaction.



Trailer Truck; Mallet Locomotive.

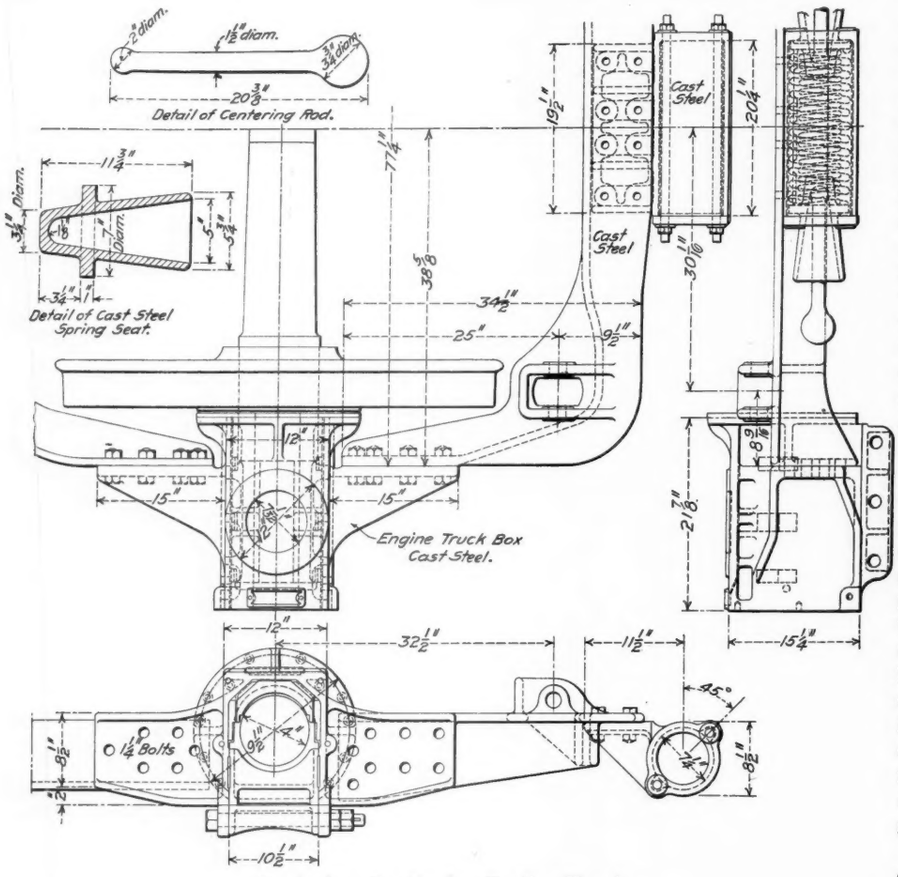
The Adams radial truck has, in the place of a radius bar, boxes which move in radial grooves, forming guides for the box. There is also a centering device, which consists of a coil spring working in an adjustable pocket. Any compression given to the spring by the truck in curving will tend to force the truck back into its normal position. Class 12-38 ¼ D 209 has 45,550 lbs. on the front truck and 44,200 lbs. on the trailer truck. Heart-shape links are used in a cast steel frame on the front truck. The centering device of the trailer truck shown on the next page is somewhat similar to that of the Adams truck described above.

With the introduction of the wide fire box and the low ash pan, it became quite a serious problem to apply a flexible truck under the fire box and locate it in such a position that it would take its part of the engine load. The Baldwin Locomotive Works, with the assistance of Keneth Rushton, chief draftsman, solved this problem by applying the links with trunnions directly over the pedestal of each trailer box and by the use of equalizers and springs. In this Rushton trailer

truck the weight is transmitted to the truck without interfering with its flexibility.

A Paris-Orleans engine, built by the Baldwin Locomotive Works, has a weight of 42,900 lbs. on the truck. The complicated centering device is applied by means of two coil springs, whose caps are riveted to the side frames and whose spring seats terminate in the centerplate, which carries no load, its only function being to guide the truck and permit a sufficient transverse motion to enable the truck to enter and leave all curves to the best advantage. The weight on the truck is borne by two concave side bearings, which have a transverse, as well as a longitudinal motion, on a finished surface of the truck bolster. This construction is in marked contrast with that of the American truck, where flexibility is combined with simplicity.

Some roads favor, while others do not approve of, brakes on engine truck wheels. The locomotive with the bogie truck,



Centering Device for Trailer Truck.

when used for fast passenger or suburban service, should have engine truck brakes applied. Quoting from a test made by the New York Air Brake Company:

"A train composed of three passenger coaches, speed 78 miles per hour, the length of stop without the truck brake was 2,640 ft., whereas with the truck brake, on the same conditions the stop was reduced to 2,440 ft., which is a decrease of 7 1/10 per cent. We feel that it is advisable for passenger service to have brakes applied to the engine truck wheels for it assures the shortest possible stop that can be made, and also it avoids wheels sliding at slow speed."

It is our opinion that the trailer truck wheels, as well as those on the engine truck, should, whenever practical, have brakes applied, especially to passenger engines, where quick stops are necessary.

The road bed, the curvature of the track, the service required and the location of the truck, relative to the drivers, are points which the locomotive builder must consider and his success will depend, to a large extent, on his ability to find the value of the unknown quantity which will satisfy these conditions. It would be an endless task to endeavor to go into the various designs of engine trucks, since every different condition imposes a corresponding change in the truck. Our endeavor has been to review a few of the engine trucks used in the evolution of the locomotive and to impress this truth: that the locomotive truck should be a simple, flexible, shock-absorbing mechanism, capable of sustaining the superimposed engine weight with the least punishment and greatest security to the locomotive.

THE CANADIAN NORTHERN RAILROAD SYSTEM.

BY R. W. WILSON.

In the history of railroad building there is no chapter more full of interest than that which may be devoted to the inception and up-building of what is now known as the Canadian Northern railroad system. Starting in 1896 as a small road in Manitoba, the Canadian Northern system has grown at the rate of a mile a day up to the beginning of the construction season of the present year, during which a considerable amount of additional mileage will be added. In a few years' time it will reach from the Atlantic to the Pacific, and by midsummer's day, 1911, the tercentenary of the death of Hendrik Hudson, Canadian Northern trains will be running to Churchill, on the west shore of Hudson bay, Canada's great inland sea. While the Canadian Northern is steadily making for terminal points on the Atlantic, the Pacific and Hudson bay, and coupling up the links of its transcontinental system, it is at the same time throwing out branch lines in all directions where the requirements of the territory it serves demand them, and where the present traffic or future prospects warrant the construction. In this way every mile of the Canadian Northern has paid its way from the date it came into operation, and left a surplus. Having done this during the construction period, its future as a completed transcontinental railroad seems assured of great success.

The Canadian Northern system comprises all the Mackenzie & Mann railroads in Canada. These are the Canadian Northern, the parent company, extending from Port Arthur westward, and its numerous branch lines; the Canadian Northern Ontario Railway from Toronto northward to Moose Mountain, 36 miles north of Sudbury and a large additional mileage in Ontario for which charters have been obtained and which will be constructed in the near future; the Canadian Northern Quebec Railway, which will connect with the Ontario division of the Canadian Northern system, and gives access to Ottawa, Montreal and Quebec, with magnificent water frontage and dock accommodation at the latter port secured by the acquisition of the Quebec & Lake St. John Railway last year as a part of the Canadian Northern system; and lastly, the Mackenzie & Mann railroads in Nova Scotia, the Halifax & South-Western, and the Inverness Coal & Railway Company, these being some 430 miles long, and opening up the Atlantic coast between Halifax and Yarmouth, and also developing vast coal deposits in Cape Breton Island. At the beginning of 1908 the Canadian Northern system had in opera-

tion considerably over 4,000 miles of well-equipped railroad. It had 600 miles more building, and over 2,000 miles more surveyed. All the foregoing lines are in rich traffic-producing territory, both freight and passenger, and the links which have to be built to connect them are likely to prove just as remunerative.

It is generally understood that the Grand Trunk Pacific is being built with special indorsement and facilities granted by the Canadian government. It is true that it was introduced as a government measure, but when one comes to look closely into its bargain with the Dominion, and compare its terms with the support given to the Canadian Northern by both Dominion and Provincial governments, it will be seen that the Canadian Northern has fared even better than the more recent transcontinental project. As well as the indorsement for its bonds, in some parts by the Dominion and in others by provincial governments, the Canadian Northern has a large land grant of enormous and ever-increasing value. The Grand Trunk Pacific has no land grant from the Dominion government, and is restricted and hampered by government control in many ways that do not affect the Canadian Northern.

The biography of Messrs. William Mackenzie and D. D. Mann has been so often written that it is unnecessary to repeat it here. Both are Ontario born and bred. Each had considerable experience in railroad building when, in 1886, they formed a partnership as railroad contractors. They subsequently built railroads in Maine for the Canadian Pacific, and then in the west they built the Calgary & Edmonton line, and also the Qu'Appelle, Long Lake & Saskatchewan line, which for many years was worked as a part of the C. P. R. system, but was most unexpectedly secured by Mr. Mackenzie from the English bondholders some two years ago and is now one of the busiest and best paying branches of the Canadian Northern. It was in the building of the Calgary & Edmonton and the Regina & Prince Albert railroads that Messrs. Mackenzie and Mann first acquired their experience and remarkable knowledge of the value of the great prairie country when provided with railroad transportation. The present flourishing condition of western Canada, which is the comprehensive name for the provinces of Manitoba, Saskatchewan and Alberta, dates practically from the time when Messrs. Mackenzie and Mann began their railroad operations in Manitoba, and where about the same time the Hon. Clifford Sifton, as Minister of the Interior, started an immigration policy for the agricultural development of the prairie that has had and will continue to have increasingly a remarkable effect on the commercial and political future of Canada. At the present rate of progression twenty years hence will probably see that part of the Dominion that lies west and north of Lake Superior greater in population and political power than Canada east of the Great Lakes. The Canadian Northern started with the van of this great movement, its enterprise has kept up with the procession, and it has the good-will of the people in the territories it serves. The Canadian Northern was the outcome of an agreement between the Roblin government of Manitoba, which is still in power, and Messrs. Mackenzie and Mann. Under this agreement Messrs. Mackenzie and Mann undertook to build railroads within the province of Manitoba and also to Port Arthur, on Lake Superior, the province assisting by guaranteeing construction bonds to the extent of $10,000 a mile.

In 1896 Messrs. Mackenzie and Mann bought the derelict charter of the Lake Manitoba Railway & Canal Company, and in the following year they built 100 miles of railroad. Extensions were made in the following year, and in 1899 the Canadian Northern Railway Company was duly incorporated to take over the whole interests of Messrs. Mackenzie and Mann, who became president and vice-president, respectively. D. B. Hanna, who had shortly before joined Messrs. Mackenzie and Mann as general manager, became third vice-president and comptroller, a position which he still holds, in addition to being president of the Canadian Northern Quebec Railway, and also of the Quebec & Lake St. John Railway. The directors of the Canadian Northern are five in number—Messrs. Mackenzie, Mann, Z. A. Lash, K.C., who is also counsel for the company; Frederic Nicholls, the president of the Canada Electric and Canada Foundry companies, and R. M. Horne Payne, resident director in England. Mr. Horne Payne is a retired stock broker who has made a study of Canadian investments, into which he has during the past twenty years influenced many millions of dollars of English and Scotch money. None of the share capital of the Canadian Northern has been sold, as during the construction period Messrs. Mackenzie and Mann, for various reasons, preferred to keep it in their own hands. The principal reason has, of course, been that they can decide any matter that arises off-hand, without the necessity of calling meetings of shareholders and the consequent publicity that in numerous instances would have been injurious to the successful carrying out of their plans. Practically all the securities sold by the Canadian Northern have been taken up in England and Scotland. These all bear a fixed and low rate of interest, and stand well on the London Stock Exchange and the provincial stock exchanges of the United Kingdom.

In 1902 the railroad from Winnipeg to Port Arthur was completed, and shortly thereafter the freight on grain between Winnipeg and navigation on Lake Superior was reduced nearly 50 per cent., to the great jubilation of the western farmers. In the same year the lines of the Northern Pacific in Manitoba were leased on long and favorable terms. At this time the Canadian Northern head office was in Winnipeg, but in the following year it was removed to Toronto. In 1905 the main line was opened to Edmonton, a distance of 1,265 miles, of which over 900 miles passes through wheat lands of the best description—almost unbroken wheat fields, all rapidly coming under agricultural settlement. In 1906 the rails reached Prince Albert from Dauphin, and in the same year the company secured another entry to the northern city by the purchase of the Qu'Appelle, Long Lake & Saskatchewan Railway from Regina to Prince Albert. All this time extensions were going on in southern Manitoba, the richest wheat belt of that province. This year the Canadian Northern line was laid into Regina, giving that city, the capital of Saskatchewan, a second direct line to Brandon and Winnipeg. The line is now reaching out toward Calgary. From Saskatoon a line is, this year, being built southwesterly to the Goose and Eagle lake districts. Very shortly a direct line will be built between Prince Albert and North Battleford. From Edmonton the Canadian Northern is extending in two directions. The main line is heading straight for the Yellow Head Pass, in the Rocky Mountains, and steel is laid west of Edmonton as far as Stony Plain. A line from Edmonton due north to Athabasca Landing has been begun, and steel is laid as far as Morinville, some 25 miles north of Edmonton. From Athabasca Landing there is water transportation to the Peace river country, into which, during the next few years, there is likely to be a great rush of settlers. To cater for this great Peace river traffic the Canadian Northern will be the first railroad in the field. This summer it has about 3,400 miles of railroad fully equipped and in operation west of Port Arthur.

Space does not permit of giving any detailed or adequate account of the towns and industries that are growing up with the encouragement and support of the Canadian Northern along its lines. At short intervals cities, towns and villages are developing at the various stations. West of Winnipeg these are mostly marked by imposing elevators alongside the tracks, standing up like giant milestones across the prairies. At Port Arthur the Canadian Northern elevators are the largest and most up-to-date in the world, with a capacity for the storage of 7,250,000 bushels of wheat. In the interior new elevators are constantly going up, as the cultivated area increases, and it is hard to say what the aggregate storage capacity amounts to. The general management of the Canadian Northern is in the very capable hands of M. H. MacLeod, with Geo. H. Shaw as Traffic Manager. These gentlemen have

their offices in Winnipeg, but much of their time is usefully and necessarily spent in traveling about over the line, attending to the company's interests, meeting its customers and trying to adjust the service to meet their requirements. There is nothing high-handed about the officials of the Canadian Northern. They realize that they have the good-will of the people along their lines, and they do not intend to lose it by any shortcomings on their part.

The Canadian Northern balances its accounts as at the 30th June in each year. Owing to the great extent of country covered and the laborious work of careful, detailed auditing, the report and balance sheet is seldom issued before September. The first year's earnings were sufficient to pay all expenses, including fixed charges, and each subsequent year's report has told the same story. The following table shows the remarkable expansion:

	Fiscal year ending June 30—				
	1903.	1904.	1905.	1906.	1907.
Miles operated	1,276	1,349	1,586	2,064	2,509
Fixed charges (in thousands)	$637	$805	$1,128	$1,504	$1,882
Fixed charges (per mile)	499	596	711	731	751
Surplus (in thousands)	222	316	416	719	1,043

It will be noticed that, as is natural, the fixed charges have steadily increased, as well as the mileage and surplus of income over expenditure. There has been large expenditure on betterments. At divisional points the engine houses and repair shops have been fitted up with improved machinery. Water stations have been increased and enlarged, and up-to-date coaling plants have been installed. Roadbeds have been improved by ballasting. Many new stations have been built and others enlarged to meet the increasing traffic. Freight sheds have been erected at many stations, and at Port Arthur, the late terminus, accommodation for freight has been provided on a scale commensurate with the remarkable development of the port. At Port Arthur there is a smelter, which, as a result of one year's operations, is about doubling its plant. The iron ore comes from Atikokun, about 142 miles west of Port Arthur, and a few miles back from the Canadian Northern main line, with which it is connected by a short spur. It is about 60 miles north of the far-famed Mesaba range in Minnesota, is of enormous and as yet unascertained area, and the Atikokun ore to-day is producing at the Port Arthur smelter as fine a quality of pig iron as any ore on the North American continent. At Moose mountain, 36 miles north of Sudbury, on the Canadian Northern-Ontario Railway, there is a range of iron ore now being opened up that in the near future will play a very important part in the iron production of the United States and Canada. A detailed description of the Moose mountain iron range, the work done, and the arrangements made for shipping the ore from Key Harbor, the new Canadian Northern port on Georgian bay, south of the mouth of the French river, would require a special article by itself.

Before concluding, a word should be said about the Hudson bay railroad to Churchill, and the new shipping route to Europe. The construction of this road has long been earnestly desired by the people of western Canada, and it has had no warmer or more energetic supporters than Messrs. Mackenzie and Mann. Some two years ago these gentlemen built a line from Etoimaine, on the Dauphin and Prince Albert line, about 95 miles, to "The Pas" on the North Saskatchewan river, something less than 500 miles south of Churchill. This was the first instalment of the Hudson bay railroad. The jealousy of politicians in the St. Lawrence basin and Maritime Provinces for a time retarded the opening up of a new commercial route to Europe, but Sir Wilfred Laurier and the members of the Dominion Cabinet have now pronounced emphatically in favor of its immediate development. A railroad map of Western Canada shows at a glance how conveniently situated is the Canadian Northern network of lines for gathering in traffic from an enormous area of the best wheat-producing lands of Manitoba, Saskatchewan and Alberta, and conveying it to Churchill. The land haul from a central point in Saskatchewan, such as Saskatoon, is very considerably shorter than the distance from the same point to Port Arthur or Fort William, on Lake Superior. The distance from Churchill to Liverpool is about the same as from Montreal to Liverpool, consequently wheat in transit via Hudson bay is saved the whole cost of transportation across the Great Lakes to ocean shipment, and also one handling, which latter is an important point. The actual saving in freight charges is estimated by some persons at not less than three cents a bushel on wheat, which will be so much of a bonus to the farmers of Western Canada, who already have cheaper freight to navigation on Lake Superior than that paid by the farmers of the Dakotas and Minnesota from corresponding and similar points. Navigation is possible in Hudson bay from early in July till the middle of November. The bay itself never freezes over; the difficulty to navigation is in Hudson strait connecting with the open ocean, and is caused by drift ice from the north getting into the strait. Reports made to the Canadian government show that apart from ice there is no other difficulty in the navigation of Hudson bay and strait. A few years will tell, for by that time the Churchill-Liverpool route will be an accomplished fact, and a visitor traveling from Europe by this line in the summer or fall months may find the shores of Hudson bay dotted with summer cottages, occupied by wealthy Winnipegers and their families. That, at least, is what was predicted by Sir Wilfred Laurier in a very eloquent speech commending the Hudson bay route to the Dominion House of Commons. There are no special difficulties in an engineering way to retard the construction of the railroad from the present northern terminal points of the Canadian Northern to Churchill, and as soon as the preliminaries are settled, Messrs. Mackenzie and Mann may be trusted to push on with the work.

RAIL MOTOR CARS IN WISCONSIN.

In the case of Colin W. Wright vs. Illinois Central Railroad Company before the Railroad Commission of Wisconsin, the complaint in which alleged inadequacy of passenger service on the Freeport-Madison branch of the Illinois Central Railroad, the commission held:

"That the introduction of the motor car marks an epoch in the development of transportation; that the testimony shows substantial and safe construction of this car; that economy in operation is in the interest of the public as well as of the railway company; that the element of danger connected with the operation of a motor car, whatever that may be, is a question of objective fact, experience and expert knowledge, rather than of subjective impulse; that motor cars have been used in increasing numbers in all the leading countries of the world, both upon company-owned and state-owned railroads, and that such operation has met with practically universal approval; that there is no evidence before the commission tending to show inability on the part of the motor car in question to accommodate the traffic on respondent's line of railroad, and that therefore the complaint be dismissed."

The petitioner, an attorney-at-law, living in Monroe, Green county, Wis., represented that since Nov. 30, 1907, the passenger train service on the Freeport-Madison branch had not been reasonably adequate for the citizens of the towns tributary to the line, who required daily, including Sunday, trains, such that they might arrive in Madison about 9 a.m. and leave about 5 p.m. Previous to Nov. 30, 1907, the petition claimed, additional train service had been installed, although such service was considered by the company to be more than the conditions warranted, which latter was proved by the fact of its being operated at a loss. The general business depression required a curtailment of expense wherever such was possible, and since adequate train service could be supplied by the use of a gasolene motor car, the operating expense of which is said to be but one-fourth of that of the steam train, the motor car was placed in the service.

The testimony in behalf of the petitioner is interesting as being illustrative of a psychological mood into which a large number of the patrons of the line might have fallen. It was testified that the motor car was considered unsafe, unsanitary and uncomfortable. The entire testimony of the petitioner's witnesses seemingly was intended to create the impression that a large portion of the passengers of the line were of the opinion that the car was dangerous; that it was improperly heated in cold weather; that it jolted and swung excessively; that the odor of the gasolene was disagreeable; that ventilation was either difficult or impossible; that the liability of loss of life in case of accident was very great, and that, on the whole, the motor car was a most hateful contrivance.

Although the petition alleged that the train service was inadequate, the petitioner did not represent, nor was there any testimony showing, that the motor car was not sufficient to accommodate all the persons applying for transportation. The commission, therefore, assumed that the accommodation was sufficient, since the opposite was not proved and since it had statistics showing only a moderate use of the seating capacity of the car.

The chief witness on the part of the Illinois Central Railroad was a mechanical engineer of the Union Pacific, who had taken a large and important part in the designing and building of motor cars in the Union Pacific shops at Omaha, Neb. This evidence is interesting, especially as it contains professional information regarding the Union Pacific motor cars. It is therefore given herewith at some length. It was stated that over four years ago the mechanical department of the Union Pacific Railroad was requested by the president of the company to design and build a gasolene motor car. Since that time, nineteen such cars had been built, and the one in the service of the Illinois Central was the fourteenth of these.

"The car is built entirely of steel, in a very strong and efficient manner. It is 55 ft. long and 9 ft. 2 in. wide. Because of the thinness of its steel walls it is somewhat wider than the ordinary passenger coach. The car has the shape of a tube, which appears to be the most effective way known in the art of construction of preventing warping or twisting and to protect the car gainst destructive influences of all kinds, such as might occur in the event of a wreck. It has 26 windows, which are circular and 24 in. in diameter, and are round, chiefly because this permits a better diagonal bracing of the car. It has two doors, one on each side, in the middle, 22 in. wide in the clear, being about 2 in. wider than the vestibule passage through Pullman cars. In case of accident the side doors are safer than the ordinary end doors of passenger cars, for the reason that in collisions of the ordinary type the platforms are jammed together in such a manner that it is impossible to open the doors and escape through them. The doors of the motor car could always be opened in such accidents, and the manner of opening of the windows also makes escape through them easier than through the ordinary windows."

Particular objection was made upon the apparent inability to heat the cars properly. The witness stated that the motor car had a greater radiating surface than an ordinary passenger coach and that the motor car was provided with a forced circulation which was far superior to the sluggish ventilation of a passenger coach. Furthermore, that if it were a fact that the heating capacity was inadequate, the defect could easily be, and would be, remedied, so that no substantial objection could be raised on this point.

Objection was made to the use of gasolene, stating it to be a serious source of danger. In this regard, the witness testified as follows:

"Gas, as it evaporates from the gasolene and is mixed with a certain quantity of air, when it comes in contact with an electric spark causes an explosion; * * * if the person handling the gasolene is criminally negligent an explosion can occur; * * * the gasolene tank is so arranged under this car that no mixture of air and gasolene can possibly take place under any circumstances. That was considered before anything else was undertaken in the construction of these cars. The gasolene is carried in a steel tank underneath the car in the least vulnerable part of the car. When full it holds about 120 gallons. The tank forms a brace from one sill of the car to the other and is protected by the walls which go down under the entrance, so that the car might be unwheeled or untrucked and slide over the track and the gasolene tank would be protected by these braces. The tank is built to withstand a pressure of 500 lbs. to the square inch, normally it carries a pressure of 3 lbs. to the square inch. If it increases to over 5 lbs. it would escape into another receptacle. It cannot be more than 5 lbs. in a vessel tested to 500 lbs. There is only one entrance into this strong receptacle. Through that entrance the gasolene is put into the tank when filling. The gasolene is led by a suitable pipe, properly protected, to the carburetor of the engine. In case that pipe were to become damaged or broken off it is so provided that no gasolene can escape from the tank. The breaking off of the pipe from the tank automatically closes a valve situated inside of the tank, so that it is impossible for gas or gasolene to escape. This has been tested all over and we know it is absolutely safe. We have made tests, therefore there remains no possibility of the gasolene becoming so mixed with the air as to produce an explosive mixture. The gasolene is conducted directly to the carburetor, where it is carbureted inside and led to the cylinder and the explosion takes place inside the cylindrical walls of the engine. * * * We have had several wrecks and collisions with this car. I have personally been present in a wreck where the car ran into the front end of a locomotive at a speed of 25 miles an hour. * * * I remained on the car during the collision. * * * There was no explosion, no displacement of the tank, no breakage, no breakage of pipes. * * * There have been no explosions and no accidents. There has been nothing approximating an accident or explosion on these cars. We have been operating them for three years, and we are operating eight in the service of the Union Pacific lines alone. * * * The advantage to the public is its freedom from cinders, dust and smoke, and its reliability. The public have taken very kindly to them as a rule. * * * Those who have ridden in an automobile know that a careless driver can make the automobile very objectionable for those riding. It is the same proposition precisely with these cars. The carelessness of the operator in not adjusting his mixture properly will result in a slight odor, escaping from the back of the car in the exhaust, which, if the windows are open, may be carried into the car. That is very easily overcome by fixing the engine so that enough oxygen enters the carburetor to properly dilute the gasolene gas. This adjustment is simply turning one screw. * * * The gasolene odor, regarding which complaint has been made, comes from the exhaust and whirls in through the windows. * * * The grade of the gasolene used is from 63 to 68, being the ordinary gasolene of commerce. Sixty-eight is the highest which the Standard Oil Company is now furnishing. * * * Cars must go to the shops in from six to nine months. Their shopping is largely dependent upon the mileage made. Some of these cars ordinarily make 80 miles a day. Others ordinarily make as high as 240 miles per day. Under normal circumstances we will say 200 miles per day. A car stays out from general repairs for from six to nine months. * * * The average speed schedule is from 25 to 40 miles an hour, depending upon the service required. Often, on the main line, we make 40 miles per hour. On the branch line, 25 miles. We have made 70 miles an hour. I personally have driven them at that rate."

The commission said that the opposition which seemed to have arisen in connection with the use of the gasolene motor car on the Freeport-Madison branch of the Illinois Central did not greatly differ from objections which have been made to

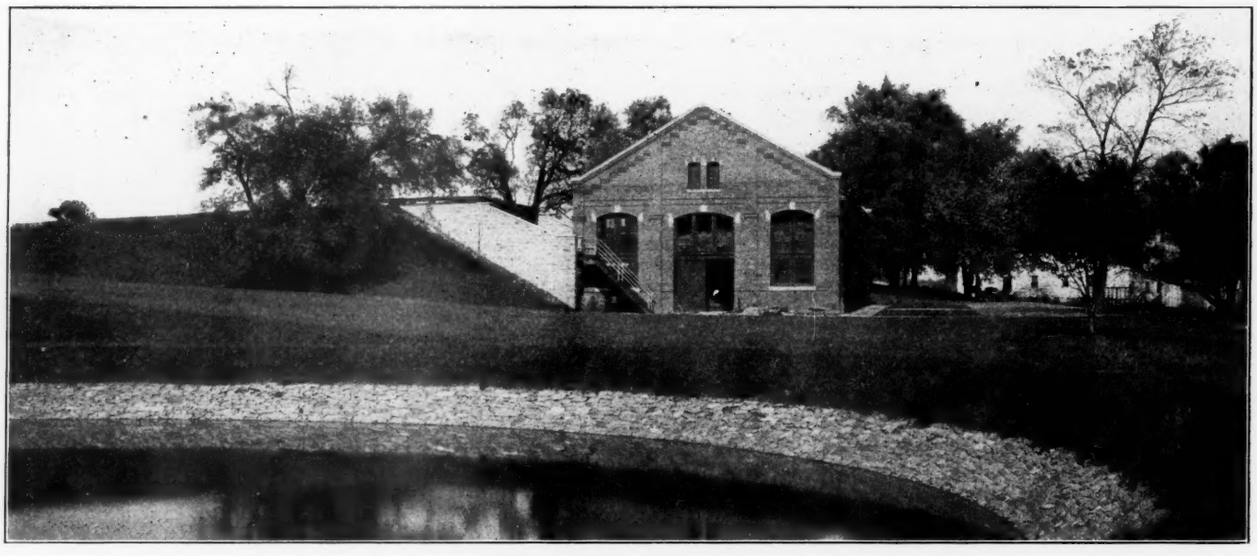
all new and important developments in methods of transportation. During the time when the Parliament of England was considering the first railroad in that country, strenuous objections were said to have been raised against the granting of the charter. Some of these were that the railroads would destroy the value of the landed estates; that game would be disturbed; that vegetation would be blighted by the smoke from the locomotive; that hens would cease to lay eggs; that the value of real estate about the stations would be decreased; that it would be very dangerous to ride at the terrific rate of 30 miles an hour, and that in general it would be much better for the people to continue to ride in stage coaches. In Germany, when the first railroad was being seriously considered, much opposition also developed, and finally the question was submitted to a distinguished medical authority, who after due consideration, submitted a report that it was his opinion that the probable effect of railroad travel would be one detrimental to the health of those who would look upon, as well as ride on, the trains. The disease which he believed the introduction of the railroad would cause he termed *delirium furiosum*. He thought that people so foolhardy as to ride on the cars were deserving of no pity should they contract the disease, but he did think it a matter of good judgment and duty on the part of the state to protect even those who were but onlookers. He recommended the placing of a high, closely-fitting fence on both sides of the track. "With the above points of history in mind," said the commission, "it is not surprising that the gasolene motor car, even in this age, should receive opposition."

In closing its action in this case, the commission suggested that a great many persons might be better accommodated if a trailer were operated in connection with the motor car, so that the passengers and their baggage might be carried at the same time. In case the laws of Illinois forbade such a trailer, it was suggested that the trailer might be carried between boundaries of the state of Wisconsin.

The shops of the Japanese State Railroads at Hiogo, near Kobe, have undertaken the construction of five new locomotives, one of which by this time must be completed. It will probably take time to enable the Japanese to build locomotives economically, but when they have once learned to do so they are likely to be close competitors, not only for the supply of their own small railroad system, but of what will be eventually the great railroad system of China, until the Chinese in turn have learned to supply themselves. The success of the Japanese with steamers must be borne in mind.

WATER SERVICE PLANT FOR THE DELAWARE WATER COMPANY AT CHRISTIANA CREEK.

A new pumping station and water service plant which will supply water for the Philadelphia, Baltimore & Washington Railroad has recently been completed at Christiana creek, near Newark, Del. The plant consists of a large supply reservoir, a sedimentation basin, a pumping station at Christiana creek, a stand pipe at Bark Mills and a power station at Bark Mills. It will later probably be extended to include the large storage reservoir at Edgemoor. The water in the supply reservoir is impounded by a new concrete dam which replaces an old stone dam. The new dam is built on a grillage of timbers and dams Christiana creek, which has a watershed of 36 square miles. The bottom of the dam is slightly above tide level and the flow line is 9 ft. above Sandy Hook datum. The estimated capacity of the supply reservoir is between 8,000,000 and 10,000,000 gallons and the estimated flooded area is 11 acres. The length of the dam is 530 ft. and the height above ground is 13 ft., while the maximum height of the dam is 19 ft.



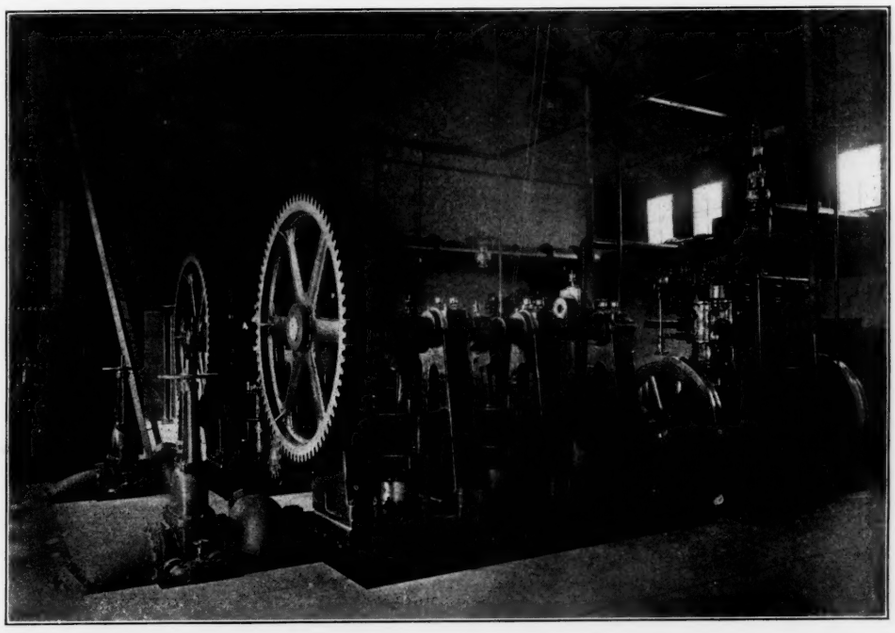
Sedimentation Basin at Christiana Creek.

The timber grillage upon which the dam rests is 11 ft. wide and is made of a series of 8 by 8-in. timbers laid with large spaces between timbers and held in place by 3 by 10-in. sheathing driven along the inner side of the grillage. These openings between grillage timbers are filled in with gravel sand and broken stone, and the whole is covered over with a solid floor of 8 by 8-in. timbers directly upon which the dam rests. The width of the dam itself is 8 ft. at the base and 3 ft. at the crest. From the reservoir the water is pumped to a sedimentation basin of 500,000 gallons capacity by a pumping station located adjacent to the dam. The bottom of this basin is paved with dry brick set on edge and the slopes are paved to a thickness of 12 in. with dry stone. The diameter at the water surface is 129 ft., the average depth of water 6 ft. and the average depth of the basin 12 ft. The intake and outtake pipes are located on the opposite sides of the basin and are 16 in. diam.

The building in which the pumping equipment is located is of brick construction with steel roof trusses, slate roof and concrete floor. It is built on a stone foundation and is 130 by 34 ft. in plan dimensions. A coal storage bin 41 by 44 ft. with a capacity of 325 tons is located near the pumping station.

The pumping equipment consists of two Westinghouse three-cylinder vertical gas engines with 13 by 12-in. cylinders, designed to operate at 250 r.p.m. and rated at 77 h.p. These

engines are geared to vertical single-acting Dean triplex pumps. The engines use gas furnished by two suction gas producers which are designed to operate with anthracite pea coal. The pumps are 13 by 15 in. and have a capacity of 1,860,000 gallons per 24 hours when running at 50 r.p.m. The



Pumping Engine at Christiana Creek.

following figures show the results secured during a test run of the plant:

Average revolution per minute of engine during test	250.0
Average revolution per minute of pump during test	42.7
Rate of pumping per 24 hrs. (gallons)	1,590,000.0
Indicated h.-p. of engine	66.3
Brake h.-p. of engine	61.0
Water h.-p. of engine (theoretical)	54.0
Mechanical efficiency of gas engine, per cent.	92.0
Mechanical efficiency of triplex pump, per cent.	88.5
Mechanical efficiency of combination of engine and pump, per ct.	81.5
Coal consumed per indicated h.-p. per hour, lbs.	1.02
Lbs. of coal per brake h.-p. per hour, lbs.	1.11
Pounds of coal per brake h.-p. per hr., per actual water pumped	1.25
Duty of pumping engine in ft.-lbs. as measured by water pumped to tank and coal actually burned	158,480,000

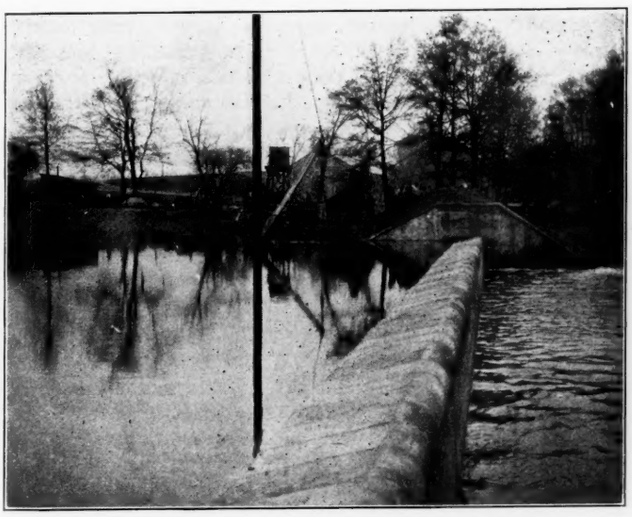
The coal used in this test was that known as Lykens Valley coal from the Pennsylvania collieries and furnished by the Susquehanna Coal Company of Philadelphia.

For each of the two gas engines is furnished one suction gas producer, including the necessary pre-heater, scrubber, purifier and piping connections between producer plant and engines with the necessary regulator at engine. Each suction gas producer and engine is designed to run with an overload of 10 per cent. for 12 hours without harm to the equipment. Piping connections are so arranged that each producer plant may run either of the engines when desired. Each of the two units is furnished with an air compressor operated by a belt from the gas engine. In addition to these two air compressors there is also provided one independent air compressor driven by a gasolene engine. These machines compress air to 100 lbs. per square inch, and necessary air storage tanks are provided so that the gas engines may be started at all times without hand power. The pumping station at Christiana creek forces the water to Bark Mills, about three miles distant, through two lines of pipe, one 12 in. and the other 16 in. diam.

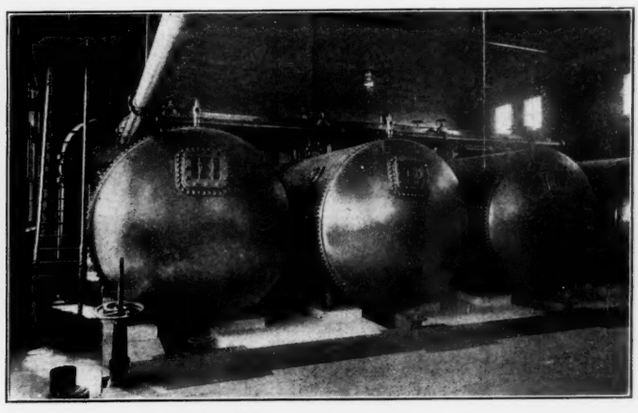
Track tanks on the Philadelphia, Baltimore & Washington are located at this point and are supplied with water from a standpipe 50 by 50 ft. of 735,000 gallons capacity, to which the two pipe lines run direct. The supply line from the standpipe to the track tank is a 24-in. pipe.

The coal storage plant in connection with the pumping station at Christiana creek is conveniently arranged and has a capacity of 325 tons. The floor of the bunkers is at the same level as the top of the producers which are fed by small cars running on narrow gage tracks. The storage bins are about 10 ft. deep and can be filled from hopper wagons which can unload from the platform directly above them, approach being made on an easy grade. The floor above the bins is of concrete and steel and the bin itself is of reinforced concrete construction.

For a more thorough removal of suspended matter at seasons of greatest turbidity a pressure filter system is provided in connection with the pumping station. The water from Christiana creek is ordinarily of very good quality, containing about 28 parts of hardness per million. The use of the filters reduces the solids to about one grain per gallon. It is intended, provided certain legal obstacles can be overcome, to run a 20-in. pipe line from Christiana creek through Wilmington to Edgemoor, where a reservoir is located about 2,000 ft. from the Edgemoor shops of the Philadelphia, Balti-



Christiana Creek Dam.



Pressure Filters at Christiana Creek.

more & Washington. This reservoir has a capacity of 20,000,000 gallons and is now completed. The water supply at that point is obtained from Shellpot creek and pumping service is provided by a duplex pumping plant. From the reservoir a 14-in. pipe line delivers water by gravity to the Edgemoor shop yard. The plans for the 20-in. pipe line from Christiana creek through Wilmington provide for two crossings of the Charles river by the pipe line. Flexible joint connections will be used at these river crossings. The power house at Bark Mills is for the purpose of furnishing water for the track tanks and heating it during cold weather. The station building is of granite, 45 by 74 ft. A coal storage bin, 38 by 12½ ft., with a capacity of 58 tons, is provided here. The boilers are three 60-in. Pennsylvania Railroad standard locomotive type boilers of 125 h.p. each.

The Edgemoor reservoir has a flow line 78.9 ft. above the Sandy Hook datum. Its capacity is 20,000,000 gallons and its average depth of water is 12 ft. The diameter at flow line is 550 ft.

The Christiana creek pumping plant was placed in service on December 14, 1907, and since that date has been operated on an average of about seven hours per day, pumping at a rate of 1,500,000 gallons per 24 hours. A record of the operating performance for seven weeks is as follows:

Week ending:—	Duty, in ft.-lbs.	Coal consumption per h.-p. of water pumped to standpipe.
December 7, 1907.....	69,000,000	2.83
December 14, 1907.....	79,200,000	2.5
December 21, 1907.....	82,500,000	2.44
December 28, 1907.....	77,200,000	2.54
January 4, 1908.....	78,400,000	2.5
January 11, 1908.....	98,700,000	2.01
January 18, 1908.....	92,400,000	2.15

The engines are loaded under this rate of pumping to about five-eighths of their designed ultimate capacity, which explains the apparently low efficiency.

The design of the entire water service plant was prepared by the engineering department of the American Pipe Manufacturing Company of Philadelphia, of which J. W. Ledoux is chief engineer. The plans were approved by J. T. Richards, engineer maintenance of way of the Pennsylvania Railroad. Work of construction was done by the American Pipe Manufacturing Company, which also furnished the pumping machinery. The gas producers were furnished by R. D. Wood & Co., of Philadelphia, Pa., and the filters by Robert Wetherill & Co., of Chester, Pa.

RAILROAD STATISTICS OF THE UNITED STATES FOR YEAR ENDING JUNE 30, 1907.

The Interstate Commerce Commission has issued an advance abstract of its annual report for the year which ended 12 months ago, from which the principal items are shown in the table below. The preliminary report for the year under review was given in the *Railroad Gazette* February 7, 1908, page 180, and the final report for the year before, that ending June 30, 1906, was given in the issue of September 20, 1907.

Railroad Statistics for Years Ending June 30.

	1907.	1906.	1905.	1904.
Miles complete	229,951	224,363	218,101	213,904
Increase, 12 months	5,588	6,262	4,197	5,927
In hands of receivers.....	3,926	3,971	796	1,323
Locomotives, number	55,388	51,672	48,357	46,743
Cars, owned, passenger	43,973	42,262	40,713	39,752
Cars owned, freight 1,991,557		1,837,914	1,731,409	1,692,194
Cars owned, total.....2,126,594		1,958,912	1,842,871	1,798,561
Employees 1,672,074		1,521,355	1,382,196	1,296,121
Per 100 miles of road....	735	689	637	611
*Total stock and funded debt in millions	.....	$14,570.4	$13,805.3	$13,213.1
*Stock & debt per mile road	.....	67,936.0	65,926.0	64,265.0
Gross earnings, millions....	$2,589.1	$2,325.8	$2,082.5	$1,975.1
Average per mile	11,383.0	10,460.0	9,598.0	9,306.0
Passengers, carried, millions	873.9	800.0	738.8	715.4
Carried 1 mile, millions..	27,718.6	25,175.5	23,800.1	21,923.2
Tons fr't carried, millions..	1,796.3	1,631.4	1,427.7	1,309.9
Carried 1 mile, millions..236,601.4		215,877.6	186,463.1	174,522.1
Av. rate per ton-mile, mills.	7.6	7.5	7.7	7.8
Av. pass. fare per mile, cts.	2.0	2.0	2.0	2.0

*Not reported in the present abstract.

Following are additional facts, given in the abstract, concerning the year ending June 30, 1907:

The mileage on which the statistics are based is 227,454.83 miles of line operated, which includes 8,325 miles used under trackage rights. The aggregate length of tracks was 327,975 miles. This includes second track, 19,420 miles; third track, 1,960 miles; fourth track, 1,389 miles, and yard track and sidings, 77,749 miles. The number of companies for which mileage is included in the report was 2,440. During the year companies owning 2,811.65 miles of line were reorganized, merged, or consolidated.

The mileage of roads operated by receivers was 45.12 miles less than in 1906. The number of roads in the hands of receivers was 29. The total number of cars of all classes, 2,126,594, was 167,682 more than for the year 1906. The total of cars includes 91,064 in company's service. These figures do not include private cars of commercial firms or corporations.

The average number of locomotives per 1,000 miles of line was 243 and the average number of cars per 1,000 miles of line was 9,350. The number of ton-miles per freight locomotive was 7,375,585, showing an increase of 143,022 ton-miles.

The number of locomotives and cars in service aggregated 2,181,982, of which 2,059,426 were fitted with train brakes, or an increase of 231,637 over the previous year, and 2,159,534 were fitted with automatic couplers, or an increase of 169,738. Nearly all the locomotives and cars in the passenger service had train brakes and automatic couplers. Nearly all the freight engines and cars had train brakes and automatic couplers.

Of the employees 65,298 were enginemen, 69,384 firemen, 48,869 conductors and 134,257 other trainmen. The total amount of wages and salaries reported as paid to employees during the year ending June 30, 1907, was $1,072,386,427. The passenger mileage increased 2,551,313,199 over the previous year. The ton-mileage, 236,601,390,103, increased 20,723,838,862 ton-miles. The number of tons carried 1 mile per mile of line was 1,052,119, indicating an increase of 69,718 ton-miles per mile of line in the density of freight traffic.

The average revenue per passenger per mile for the year ending June 30, 1907, was 2.014 cents. For the preceding year the average was 2.003 cents. The ratio of operating expenses to earnings for the year 1907 was 67.53 per cent. For 1906 it was 66.08 per cent.

The gross earnings from the operation of 227,454.83 miles of line ($2,589,105,578) were $263,340,411 greater than for the year 1906. Operating expenses were $1,748,515,814, or $211,638,543 more than in 1906. The gross earnings in detail were: Passenger, $564,606,343—increase, $54,573,760; mail, $50,378,964—increase, $3,007,511; express, $57,332,931—increase, $6,322,001; other earnings from passenger service, $12,674,899—increase, $1,360,662; freight revenue, $1,823,651,998—increase, $183,265,343; other earnings from freight service, $6,113,648—increase, $468,426; other earnings from operation, including unclassified items, $74,346,795—increase, $14,342,708.

The operating expenses were assigned as follows: Maintenance of way, $343,544,907; maintenance of equipment, $368,061,728; conducting transportation, $970,952,924; general expenses, $65,404,655; undistributed, $551,600. Operating expenses averaged $7,687 per mile of line, an increase of $775 over 1906.

The net earnings amounted to $840,589,764, an increase over the previous year of $51,701,868. The net earnings per mile of line for 1907 averaged $3,696; for 1906, $3,548, and for 1905, $3,189. The amount of income attributable to sources other than operation was $286,583,942. This amount includes the following items: Income from lease of road, $124,705,781; dividends on stocks owned, $88,523,952; interest on bonds owned, $24,361,054, and miscellaneous income, $48,993,155. The total income of the railways ($1,127,173,706)—that is, the net earnings and income from lease, investments and miscel-

laneous sources—is the amount from which fixed and other charges against income are taken to ascertain the sum available for dividends. Such deductions aggregated $677,712,518, thus leaving $449,461,188 as the net income for the year available for dividends or surplus.

The amount of dividends declared was $308,137,924, leaving as the surplus from the operations of the year $141,323,264; for the preceding year it was $112,334,761. Out of income were paid these items: Salaries and maintenance of organization, $648,835; interest accrued on funded debt, $344,242,617; interest on current liabilities, $16,671,532; rents paid for lease of road, $128,766,452; taxes, $80,312,375; permanent improvements charged to income account, $38,552,890; other deductions, $68,517,817. The complete report includes a summary showing the total taxes and assessments of the railways by States and Territories, and also an analysis showing the basis of assessment.

The total number of casualties to persons was 122,855; 11,839 killed and 111,016 injured. The casualties to passengers and to employees (except in shops, etc.), have been reported heretofore in the quarterly accident bulletins regularly reprinted in the *Railroad Age Gazette*. The present report gives the figures for "others," mostly trespassers, as follows: Total number of persons other than employees and passengers killed, 6,695; injured, 10,331. Of persons trespassing 5,612 were killed and 5,512 were injured. The total number of casualties to persons other than employees from being struck by trains, locomotives, or cars was 5,327 killed and 4,876 injured. At highway crossings 934 were killed and 1,817 injured. The ratios of casualties indicate that 1 employee in every 369 was killed and 1 employee in every 19 was injured. With regard to trainmen—that is, enginemen, firemen, conductors and other trainmen—it appears that 1 trainman was killed for every 125 employed and 1 was injured for every 8 employed.

FIRE FIGHTING EQUIPMENT FOR TUGBOATS.*

BY R. H. NEWBERN,
Superintendent Insurance Department, Pennsylvania Railroad.

The development of the tugboat as a fire-fighting machine was largely due to its superior advantage in fighting waterfront fires, as compared with the difficulty usually experienced by fire departments in working from an inshore position.

Railroad companies and other owners of valuable waterfront properties operating their own towing services recognized the value of such protection over thirty years ago, and in a small way began to equip their tugs with fire apparatus. These tugboats made a creditable record in actual fire service, and, as a matter of fact, demonstrated the usefulness of city fire boats, the first of which was built a few years later.

There has been almost no attempt west of the Atlantic seaboard to equip tugboats with fire apparatus. This is due, perhaps, to a slight extent, to the difference in the character of the property to be protected. In the east the risk lies chiefly in long, narrow piers extending in some instances over 1,200 ft. into the water, while along the Great Lakes and inland rivers the water front is usually a continuous bulkhead and generally more accessible to the city fire department. The style of tugboat also differs; the western boats operating on inland rivers with short bends have smaller but high power units.

Assuming the average tugboat to cost from $40,000 to $50,000, an expense for fire equipment of about $3,500 might be assumed to be a reasonable and proper expenditure, and the suggested equipment stated below is not intended to exceed such amount.

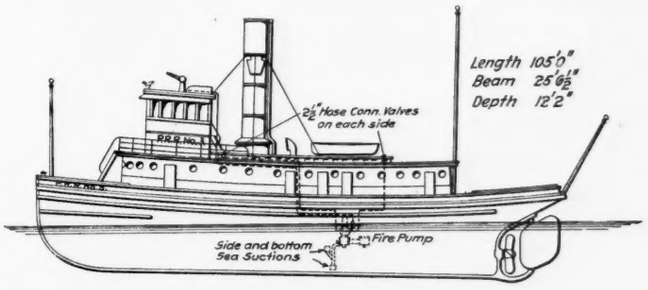
It is hardly fair to charge the entire cost of the fire pump to fire protection. It serves an emergency purpose on vessels equipped with surface condensers in the event of a breakdown of the circulating pump—a connection being usually provided between the fire pump and condensers; it is also used to pump the bilge and has a separate suction connection for this purpose. The fire pump, also, by means of pipe connections through the side of deckhouse, can render assistance in pumping out vessels in a sinking condition. For this purpose all well-equipped tugs carry about 40 ft of 6-in. rubber suction hose, interwoven with a steel bent spring, having one end fitted with a brass strainer. This feature is at times valuable to marine underwriters and to the owners in rendering salvage services.

Description of an Average Boat and Equipment Recommended.

Displacement.—300 tons.
Dimensions.—Length, 100 ft.; beam, 24 ft.; depth, 12 ft.
Tonnage.—Gross, 185; net, 125.
Speed.—Twelve miles per hour.
Hull.—Angle-iron frame, with floor beams and keelsons of angle-bars; hull plating, decks and deck house of mild steel; two bulkheads (watertight) of ¼-in. steel plates.
Power.—Boiler: Cylindrical "Scotch" type, designed for working pressure of 160 lbs.
Engines: Fore and aft, vertical compound with link valve gear, connected with surface condensers, developing 700-h.p.
Propeller.—Four-bladed open-hearth steel single screw, on forged steel shafting, 8½ in. diameter.
Pumps.—Circulating: Centrifugal, steam-driven, 6-in. stroke and 6-in. cylinder.
Air (vacuum): Vertical simplex, 8-in. stroke, 6-in. steam cylinder.
Boiler Feed: Vertical duplex, 6-in. stroke, 4-in. water cylinder.
Fire: Duplex, plunger type, 12x9¾x10 (800 gallons per minute.).
Where salt water is pumped, internal fittings should be brass composition—including cylinder lining, piston plunger, piston rod, valve body and seats.

The fire pump is preferably placed below the water level, affording a slight head on the suction side to avoid priming.

The difference in the ratio of piston areas in the fire pump, as compared with national standard specifications, is due to the fact that marine boilers for tug service are designed for a working pressure of about 150 lbs., while fire pumps ordinarily operate under lower steam pressures.



Pennsylvania Tug With Fire Apparatus.

Suction is provided by an 8-in. copper pipe, with two sea connections from opposite sides of the boat, one well under the bottom and the other from 3 to 4 ft. below water level. Between the suction pipe and side of hull a brass fitted valve is flanged on an 8-in. cast iron box riveted to the inside of hull.

A strainer of ½-in. wrought iron plate, with ½-in. holes, is bolted to the outside of hull, the combined area of openings being twice the area of suction pipe. A ½-in. steam connection is run to each box.

Two suction connections are advisable. While the upper is generally used the lower is brought into service when ice or driftwood would choke the upper strainer. Steam connections are fitted to the valve boxes. A steam jet exerting a reverse pressure through the strainer will very often force away obstructions.

Wrought iron strainers are recommended for use on metal hulls to overcome galvanic action resulting from use of brass or copper, when in the presence of a salt or saline solution. In fresh water or on wooden hulls brass or copper plate strainers are recommended.

The piping should be galvanized wrought iron. The pump is

*Paper read before National Fire Protection Association, at Chicago, May 28.

fitted with five delivery pipes, two 3-in. pipes with outlets on forward end of boat on each side of upper deck and two similarly placed on the after end

The fifth outlet is a 4-in. copper pipe connection to top of pilot house supplying a permanently located nozzle.

The delivery pipes from pump are connected with a manifold fitted between the delivery side of pump and its air chamber, and each connection has an angle valve, placing the control of all water delivery in the hands of the engineer in charge of the pump.

In the installation of the delivery pipes no angle fittings are used. Wherever turns are necessary the pipes are bent to as large a radius as possible to reduce friction loss. Between the pump and outlets the pipes are led so that the water when quiescent will drain back to the pump.

In the new city fire boats the main discharge pipe from fire pump is carried direct to cast iron turret with a number of hose connections, each controlled by a separate gate valve and surmounted by permanent nozzle. This arrangement is practicable for tugboats, and besides the economy in piping is more convenient for connecting and laying hose, and places the entire control of valves under the supervision of one man.

The rules and requirements of the Board of Supervising Inspectors, United States Government, provide that fire pumps on all classes of steamers, including tugboats, shall be fitted with "water gage and a pressure relief valve adjusted to lift at 100 lbs. pressure," it being the purpose of the latter requirement to protect fire hose from excessive pressure. It is generally permissible, however, on boats where good quality hose is carried to raise the limits on relief valves during a fire as high as 150 lbs. This additional pressure is of great advantage where long leads of hose are necessary to reach buildings on shore, distant from the water front, and particularly when three lines are siamesed through one nozzle.

Equipment.—The character and amount of equipment to be carried will be regulated by the capacity of the fire pump, steam supply and number of crew.

Hose.—Six hundred ft. of 2½-in. best quality, 4-ply rubber, on two stationary reels, 300 ft. each, located in deckhouse closets, or on deckhouse roof and protected by waterproofed canvas covers. The superiority of rubber hose for this service is generally acknowledged, due to the constant exposure to moisture and the lack of facilities for properly drying hose on a tug.

Couplings.—Should be expansion ring and of the same type, diameter and thread as the local corporation. Where a boat is employed in waters adjacent to two or more cities having different standards, adapters should be provided to permit connections with each. Where necessary a supply of enlargers should be provided for connecting the tug lines to automatic sprinkler systems, and to "Siamese" connections on the outboard end of fire mains, installed on many of the large piers.

Turret Nozzle—Siamese Deluge Set.—Nozzle to be of brass, easily manipulated, with 1¾-in. tip, permanently located on top of pilot house. Usually with the average fire pump this nozzle has an effective horizontal throw of about 110 ft. A "Siamese" deluge set should also be provided. This consists of 8 ft. of 4-in. hose, having nozzle with large tip supplied from three 2½-in. hose connections, with an automatic check valve in each. This is an effective device, throwing a large stream a great distance.

Play Pipes (4).—To be brass, smooth bore, 24 to 30 in. long, with tips varying from 1⅛ in. to 1¾ in. openings. Two pipe holders should also be provided, to be placed in holes cut in top of deck rail on each bow. A cellar pipe should also be carried.

Other Equipment.—Two hand chemical extinguishers, 3 gals. capacity, 2 axes, 2 pike poles, 2 burst hose jackets and 6 fire pails.

Crew.—The full complement will vary between five and seven men, made up as follows:

Captain (Pilot).
Engineer.
Fireman (2).
Lineman (1 or 2).
Cook.

The captain, engineer and one fireman will be occupied with their respective duties, leaving three men to handle hose lines, with the captain in charge of the turret nozzle. For communication between the pilot house and engine room the speaking-tube is preferable to bells and gong, which might be confusing, should the tug be maneuvering around a fire on its own bell signal.

Tugboat protection has been developed to such an extent by one company owning numerous water terminals that a separate tugboat fire alarm system is installed on its properties with indicator and gong in the float office, where tugs are always on duty, and a tug can be brought into fire service in a few minutes. It is also the practice to assign a tugboat to the larger terminals on Sundays and holidays for fire service only.

In one instance where a large water-front terminal is provided with an effective private high-pressure fire line, in addition to a fleet of tugboats equipped with fire apparatus, the latter is considered fully equal in efficiency to the former.

No recognition has been given to tugboat protection by underwriters. What has been done has been solely for self-protection, and it is possible, if a reasonable allowance in rate were made to owners of tugs or owners of water-front properties operating a towing service, it might serve to encourage the more general introduction of these valuable adjuncts in fire extinguishment.

It may be stated that the equipment described above is intended to make each tugboat about equal in efficiency to a steam fire engine. Nothing less has been considered adequate.

In obtaining data for this paper the conditions in Boston, New York, Philadelphia, Baltimore, Norfolk, Buffalo and Chicago were looked into. Boston, with its extensive and valuable water front, is dependent upon one city fireboat, and has no tugboats equipped with effective fire apparatus. New York and Norfolk are particularly well provided with tug protection, and Philadelphia and Baltimore moderately so. Practically no attempt has been made by tug owners in the other cities mentioned to take advantage of the possibilities of this type of fire protection.

SIDE DOORS IN SUBWAY CARS.

The Public Service Commission, First District, of New York, has issued an order requiring the Interborough Rapid Transit Co. to equip 16 cars with four side doors each, two of these doors to be in positions of the ones now in use, while the two additional doors will be placed at not less than one nor more than two doors' width from them. This arrangement will provide two entrance and two exit doors, the former being in the same positions as the present ones. The rebuilt cars are to have conspicuous signs informing the passengers that the doors at the ends of each car are for entering and the ones near the middle are for leaving. It is also provided that the cars be equipped with pneumatic or other mechanical or electrical devices so arranged as to open and close the doors quickly, and automatically to signal the motorman when the doors have been closed. The 16 cars, not less than half of which are to be motors, the equipment of which the order provides, will make up two express trains, and by being operated daily on the express service during the morning and evening rush hours, will afford an opportunity to study the advisability of the change for subway cars, as recommended by Bion J. Arnold, electrical expert of the commission. These 16 cars are to be completed and ready for operation not later than October the 15th.

In issuing this order the Public Service Commission held that it had been made to appear from the evidence given at the investigations, that the regulations, equipments, appliances and service of the Interborough Rapid Transit Co. have been and are in certain respects unsafe, unreasonable, improper and inadequate in that the cars used are insufficiently supplied with doors and that it appears that the changes and improvements set forth in the order are just, reasonable, safe, adequate and proper.

VALUATION OF RAILROAD PROPERTY.

BY HENRY FINK,

Chairman of the Board, Norfolk Western.

No definite basis of valuation having as yet been determined, we will examine as briefly as possible some of the methods which have been suggested for the valuation of railroad property.

By keeping in mind the use that is proposed to be made of this valuation, the reader will be able to judge for himself whether these objects can be accomplished by the proposed methods.

PHYSICAL VALUATION BASED ON THE ORIGINAL COST OF THE PROPERTIES.

All methods of determining the physical valuation of railroad properties have in common the underlying idea that the terms "cost" and "value," when applied to railroads, are synonymous. By the method we are now considering the property is divided into its constituent parts, the original cost of each part being determined separately. For example, it is proposed to ascertain the original cost of the right of way, depot grounds and other real estate, embankments, cuts, tunnels, culverts, bridges, ballast, cross-ties, rails, switches, station buildings, employees' buildings, machine shops, office buildings, telegraph line, machinery, locomotives, passenger cars, freight cars, etc. To the aggregate amount of this original cost there is to be added the cost of all the property which has been acquired since the road was turned over to the company by the contractors. Whether the condition of the property at the time the valuation is made is to be taken into consideration, and a deduction is to be made for depreciation, the writer does not know. In view of the difficulty, and, in case of the older railroads, the impossibility of ascertaining the original cost, and the cost and value of all the additions that have been made to the property, it is proposed to make a

PHYSICAL VALUATION BASED ON COST OF REPRODUCTION

By this method the property is also divided into its constituent parts; but the value of each part is ascertained by the cost of reproducing it at prices ruling at the time of the valuation.

For example: Right of way, depot grounds and other real estate is valued at the prices of adjoining lands; the cost of graduation and masonry is ascertained from the prices per cubic yard for which such work can be done at the time of the valuation. As the quantities and classification of material can rarely be obtained from the original engineering notes, it will be necessary to put engineering parties in the field to survey the railroads, cross-section the cuts and fills, measure the bridges, tunnels, etc. A careful inspection of every part has to be made to determine the amount of depreciation. For it is the cost of reproducing the property in its condition at the time of its valuation which is to be ascertained. As the cost of materials and labor fluctuates, and the railroads have to add constantly to their property in order to furnish adequate facilities for the requirements of the traffic, it follows that what may be a fair valuation of a railroad one year may not be so one or two years later. Hence, it would be necessary to make new valuations from time to time. The proposed method is the same as that adopted since 1902 by the Board of State Tax Commissioners of the state of Michigan for the appraisal of railroad properties for the purpose of taxation.

The following table from Bulletin 21 (on the "Commercial Valuation of Railways Operating Property in the United States, 1904"), issued by the Department of Commerce and Labor at Washington, will give the reader a good idea of this method:

SUMMARY OF ALL RAILROADS IN MICHIGAN.

Mileage.

Main track	7,052.35
Second track	164.83
Branches	730.92
Spurs and sidings	2,904.70

Value of Physical Properties.

	Cost of reproduction.	Present value.	Pr. ct. of new.
1. Engineering, 4 per cent., items 2-25 inclusive, and 33.	$5,386,772	$5,386,772	100.0
2. Right of way and station grounds.	27,745,313	27,745,313	100.0
3. Real estate	863,337	863,337	100.0
4. Grading	21,699,995	21,693,024	100.0
5. Tunnels	1,148,070	1,093,445	95.4
6. Bridges, trestles and culverts	8,027,119	6,337,819	78.8
7. Ties (cross and switches)	11,139,024	6,148,748	53.9
8. Rails	28,703,012	21,865,994	76.1
9. Track fastenings	3,845,030	2,987,982	77.6
10. Frogs, switches and crossings	1,469,721	1,040,120	71.0
11. Ballast	3,723,556	3,723,556	100.0
12. Track laying and surfacing	6,355,638	6,400,972	97.5
13. Fencing	2,763,595	1,627,790	58.8
14. Crossing cattle guards and signs	607,542	428,474	70.4
15. Interlocking and signal apparatus	501,683	448,686	89.3
16. Telegraph (30 telephones)	258,985	134,797	52.0
17. Station buildings and fixtures	4,108,736	3,111,103	75.8
18. Shops, roundhouses and turntables	2,157,228	1,467,569	68.2
19. Shop machinery and tools	1,107,910	882,634	79.7
20. Water stations	725,670	522,135	72.0
21. Fuel stations	303,289	201,461	66.2
22. Grain elevators	1,336,794	1,009,043	75.0
23. Warehouses	258,646	183,910	71.3
24. Docks and wharves	5,531,919	3,831,934	69.4
25. Miscellaneous structures	1,234,345	856,253	69.4
26. Locomotives	9,021,517	5,992,053	66.4
27. Passenger equipment	3,197,473	2,277,271	71.2
28. Freight equipment	19,734,246	13,690,587	69.4
29. Miscellaneous equipment	702,940	423,689	60.3
31. Ferries and steamships	1,725,300	1,095,500	63.5
32. Electric plants	93,061	69,898	96.8
33. Terminals	.....	.....	...
34. Legal expenses, 0.5 per cent., items 2 to 25 inclusive, and 33.	673,349	673,349	100.0
35. Interest, 3 per cent., items 1 to 34, inclusive	5,290,549	5,290,549	100.0
36. Miscellaneous expenses:			
Organization, 1.5 per cent.	2,645,277	2,645,277	100.0
Contingencies, 10 per cent.	18,428,759	15,127,110	62.3
Total cost of construction and equipment	$202,716,252	$166,398,156	81.4
*Value of non-physical properties		35,814,043	
Total value of physical and non-physical properties		$202,212,199	
37. Stores and supplies	1,474,829	1,474,829	82.2

*Figures furnished by Prof. Adams.

This inventory method is supplemented by a consideration of the earning capacity of the roads, and in the same Bulletin will be found an interesting letter from Prof. Henry C. Adams, addressed to the Michigan Board of State Tax Commissioners, in which he recommends a rule for the appraisal of non-physical elements of corporate property.

PHYSICAL VALUATION, SUPPLEMENTED BY THE PERSONAL EQUATION, OR METHOD ADOPTED BY THE VIRGINIA COMMISSION.

We have seen that in fixing the maximum value, per mile, of Virginia railroads, the commission was largely influenced by the property principle by direct assessment—which is essentially a physical valuation principle. The commission says in respect to valuation matters that it knows no better or more reliable method than to give due and proper consideration and weight to the following matters, among others:

"1. The original cost of the property, so far as it is shown.

"2. The amount of the capital and bonded debt of the company applicable to the property in this state.

"3. The market value of such stock and bonds.

"4. The cost of reproducing the property anew so far as it is shown.

"5. The cost of reproducing the property in its present condition so far as it is shown.

"6. The properly assessed value of the property for purposes of taxation.

"7. The personal knowledge of the property by the commission."

It then proceeds to say that "no one of these considerations should control, but due weight should be given to each." But it immediately afterward observes that "the original cost of a railroad and its equipment is often unascertainable, and it is wholly impracticable to ascertain the cost of reproduction—either new or in its present condition," and that "the most unreliable and misleading of all the foregoing considerations is the amount or present market value of the stock and bonds of the road."

This would seem to reduce the seven matters to be considered to only two: that is, the 6th, or the properly assessed value of the property for purposes of taxation, and the 7th, the personal knowledge of the property by the commission.

It should not require any argument to show that the methods above described cannot result in a fair valuation of property for any purpose, because the principal characteristic of a purely physical valuation is gross inequality. For example: The cost of grading, masonry, bridges, tunnels, etc., of a comparatively new railroad built through a mountainous country may be five times greater than that of an older road built through a valley or on a plain, while the value as a railroad, measured by its efficiency to serve the public and the volume and character of its business, may not be one-tenth part as great as that of the road built in the valley or on the plain.

The underlying error of the method is that cost represents value. The cost of preparing a roadbed for the track adds nothing to the value as a railroad, no matter what its cost may have been. The advocates of a physical valuation impute value to the cost of things which contribute little or nothing to the real value as a railroad, and they disregard the things which have real value; that is, the efficiency as an instrument of commerce, and the degree of success in building up the country and developing its traffic as measured by its earning capacity.

In view of these facts, and others which might be mentioned, it is impossible to escape the conclusion that a physical valuation is irrational in principle, and impracticable of application.

VALUATION BASED ON MARKET VALUE OF BONDS AND STOCKS.

Unlike the physical valuation, this method has a rational basis. The value of a railroad depends on its net earning capacity, and the market value of its securities under normal conditions reflect such earnings, as well as the physical condition of the property and the degree of efficiency with which it is able to serve its purpose and afford safe, regular, expeditious and cheap means of communication between sections of the country, and especially the volume and character of the traffic it has been able to develop in the course of years.

Wall street is a good appraiser of values. The market values of stock represent the best judgment of thousands of men—investors and speculators—who make it a business to study railroad problems and to keep themselves constantly informed of all the conditions which influence or affect the earning capacity of the roads. It is true that prices of stock fluctuate—at times violently—but this difficulty can be overcome in a measure by using the average prices for long periods, such periods being judiciously selected with reference to normal conditions of the market. No doubt this method would give good results when applied to railroads which have been in operation for many years, in old and well-developed sections of the country, for generally the stocks of such roads are bought largely for investment. Their prices do not fluctuate materially, and owing to the enhanced value of real estate and terminals, the value of the property is generally greater than the aggregate market value of the securities representing it. But it is different with comparatively new roads, which, to a great extent, have to develop the business which is to support them, and also with the newly reorganized companies. In these cases the method of valuation based upon the market value of the stocks and bonds would not give satisfactory results.

THE TRUE MEASURE OF VALUE OF A RAILROAD IS ITS EARNING CAPACITY.

Corporations build and operate railroads for the purpose of earning dividends for their stockholders (if they can) by selling transportation to the public. The value of a railroad depends upon the degree of efficiency with which it can serve its customers. This efficiency is reflected in their earning capacity and is affected by various conditions and circumstances—some of which may be enumerated as follows:

1. Location and construction with reference to sources of traffic and economy of operation.
2. Character and amount of transportation facilities, terminals, etc.
3. Degree of success of the efforts to develop the resources of the country and in locating commercial, manufacturing, mining and other industries which afford traffic.
4. Volume and character of the traffic.
5. Conditions affecting the value of the service; that is, the rates of transportation which can be charged to the customers.
6. Competition with other railroads, water lines, and between markets.
7. Good-will of the customers, and good feeling generally of the people.
8. Skill, industry and honesty in the financial and physical operation of the road.

Some of these conditions affect the earning power more than others; but all of them are reflected in the net earnings of a road. Therefore, the net earnings are the true measure of the value of a railroad. The truth of this cannot be successfully controverted.*

It is manifest that the earning capacity cannot be considered by the advocates of valuation, because, as the Kentucky Commission observes in respect to the apportionment of the annual charge for valuation:

"Certainly neither gross earnings nor net earnings can be a satisfactory basis of apportionment of these charges for this purpose, particularly where the purpose of the apportionment is to determine the propriety of the rates from which these gross earnings and net earnings result. In this case the earnings result from the rates in question. This annual charge for valuation is in a sense part of the carrier's cost, and to attempt to justify the apportionment of costs by the earnings resulting from rates, and then to justify the rates by the apportionment of costs based on the earnings resulting from the rates, would clearly be reasoning in a circle."

The commission's reasoning is of course correct from its standpoint, but it does not prove that earning capacity is not a good measure of value of railroads. It merely proves the fallacy of the method of ascertaining the reasonableness of rates from a valuation of the property used.

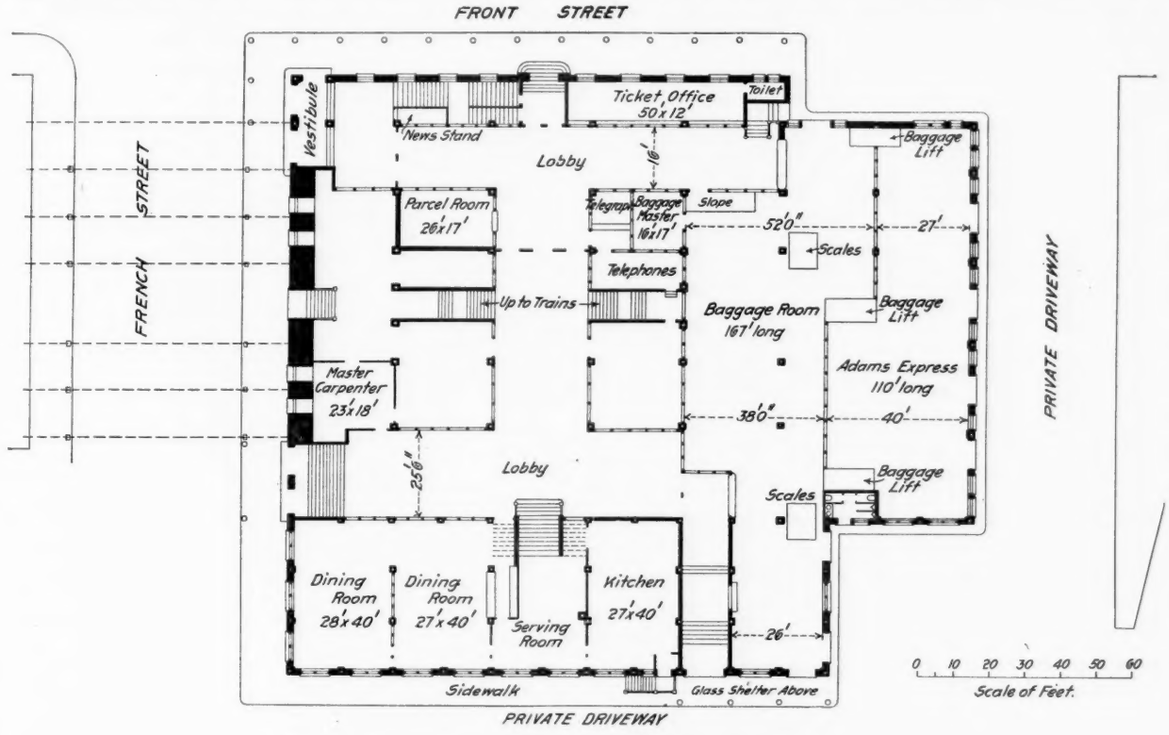
(To be continued.)

The organization of the employees of the Italian State Railroads petitioned for the pardon of the leaders of a "sympathetic strike" who had been dismissed from the service and for certain improvements in the condition of the employees, following close after advances in wages, etc., had been made. These requests were all refused, and even socialistic leaders declared that enough had been done for the railroad employees until more should be done for other workmen. Hereupon the central committee of the railroad employees ask that the management of the railroads be committed to an organization of the employees, under a lease similar to that which was made to the three operating companies from 1885 to 1905, though the employees have no capital and can command none.

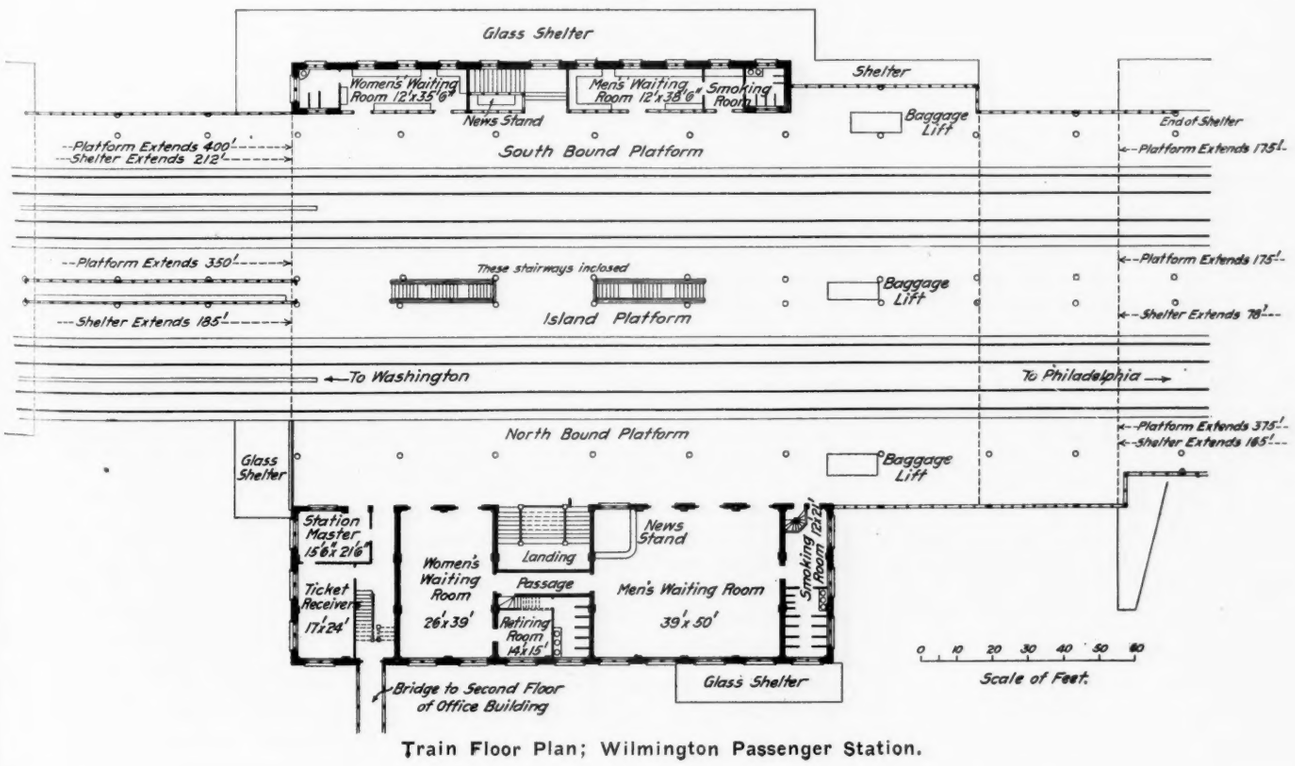
*The method of applying the net earnings to the commercial valuation of railroads is treated exhaustively and with great ability in Bulletin 21 of the Department of Commerce and Labor, Bureau of the Census, by Prof. Percy O. Adams, by Prof B. H. Meyer, and by William J. Meyers. Prof. B. H. Meyer also contributes a very interesting paper on the valuation of railroads in Prussia, Switzerland and France, for the purpose of the repurchase of chartered railroads by those states.

WILMINGTON PASSENGER STATION.

The new passenger station of the Pennsylvania Railroad at Wilmington, Del., is at the southeast corner of Front and French streets, adjoining the new Pennsylvania office building, to which it is connected at the second floor by a footbridge 50 ft. long and 8 ft. wide. The building has a frontage of 167 ft. on French street and 193 ft. on Front street, the Front street side extending to a 40-ft. private driveway. The four tracks are placed at the second floor level of the station, 17 ft. above the sidewalk, and are supported on steel columns and girders. The space under the tracks, used for station purposes, is divided into a number of rooms and passages. There are entrances on both French and Front streets, but the main entrance is at the corner near the ticket office, which is 12 ft. wide x 50 ft. long, and is on the Front street side. A lobby or passage 25 ft. wide extends across the first floor, parallel with French street. In the end, opposite the Front street side, is a large stairway leading to the second or train floor. On the sides of this lobby are a lunch room, 28 ft. x 40



Ground Floor Plan.



Train Floor Plan; Wilmington Passenger Station.

ft.; dining room, 28 ft. x 40 ft.; package room, telegraph office, telephone booths, toilet rooms, master carpenter's office and various other offices. Adjoining the lunch room are the serving room, store room and kitchen. A baggage room, 39 ft. x 131 ft., extends from Front street to the passageway between the station and the office building. Adjacent to the baggage room, on the east side, facing the private driveway, is the express room, 27 ft. x 110 ft. Three elevators, each 5 ft. x 14 ft., are provided in the baggage room.

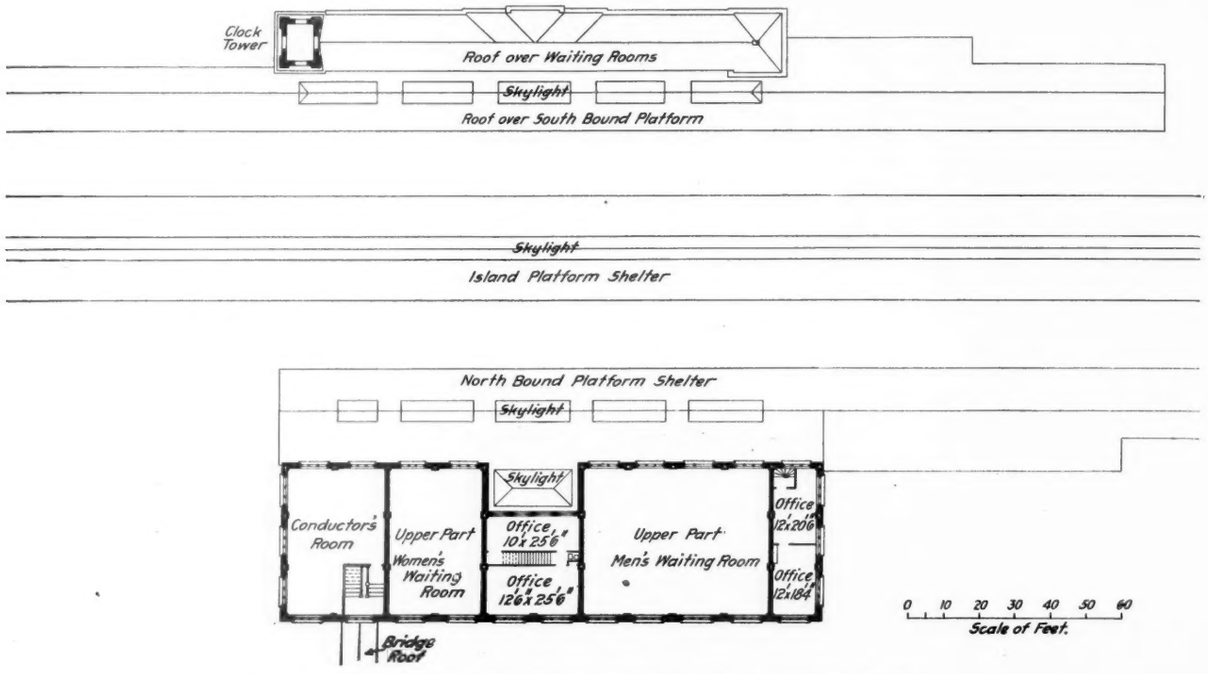
The second story is divided by the tracks, the main portion of the station being on the south side. This is known as the northbound station, as trains for Philadelphia and other northern points leave from this side. Similarly, the opposite side is known as the southbound station, the Baltimore, Washington and other southern point trains leaving there. The two accommodation tracks are on the outside, and the express tracks in the center. People wishing to board the express trains must do so from the center, or island platform, placed between the express tracks. This platform, 25 ft. wide and 800 ft. long, has on it two waiting rooms, each 6 ft. x 75 ft.; a baggage elevator, and two 6-ft. stairways leading to the first floor.

In the northbound station on the train floor are women's waiting and retiring rooms and rooms for the station master and the ticket receivers. These are close to the bridge extending to the office building. On the third floor of this portion of the building are conductors' rooms and offices. The southbound side at the train floor level contains a women's waiting room, 12 ft. x 36 ft.; men's waiting room, 12 ft. x 38 ft.; smoking and toilet rooms. The northbound platform is 600 ft. long, with a 391-ft. shelter; the southbound platform is 800 ft., with a 451-ft. shelter, and the center platform, 750 ft., with a 486-ft. shelter. All of these shelters are built of steel and wood.

The station is without a cellar, since the elevation of the ground is but a few feet above tide-water in the Christiana river, a short distance south of the station. The foundations are wooden piles and concrete walls and piers. The exterior of the building up to the first floor window sills, is finished in light colored granite. Above this base, the construction is red brick with red terra cotta trimmings and cornices and red tile roof.

The corner at Front and French streets is extended above the main roof, forming a tower. This tower is of brick and terra cotta, and contains a clock with illuminated glass dials, 3½ ft. in diameter. The interior passages are finished with polished granite wainscoting and light colored brick walls above. The main waiting rooms are finished with terra cotta base, light brick walls and plastered ceilings having heavy plastered moldings and beams. The floors are of marble. The toilet rooms are finished in marble, and have nickle plated pipes and fixtures throughout, and the other rooms are finished in plaster, with quartered oak finished woodwork. All floors, roofs, platforms, etc., are made of steel, about 1,000 tons of which were used in the building. The stairs to the northbound and to the southbound stations are built of ornamental iron. Those leading to the island platforms are of concrete. Ornamental iron shelters with glass roofs are placed over the sidewalks.

The building is heated by steam. The steam generating plant and the machinery for operating the elevators are in the new power house, 230 ft. southeast of the station building. The electric current for lighting the station is obtained from the Philadelphia, Baltimore & Washington Shelpot shops at Landlith, two miles from the station.



Roof and Entresol Floor Plans; Wilmington Passenger Station.

USE OF ASHES ON EMBANKMENTS.

Mr. Bauer, an officer of a railroad in Bohemia, writes to the *Journal* of the German Railroad Union that for the restoration and preservation of slopes in earth cuttings and embankments, after these have been washed down, locomotive ashes have proved of great value. The slopes are cut into steps 2 ft. or 2½ ft. high and wide, and the profile then reestablished with a mixture of the earth that has been washed down, or other fertile earth, and locomotive ashes, half and half, the new slopes seeded with grass and 10 per cent. white clover, and they planted with young locusts (*robinia pseudacacia*) 40 in. apart both ways. These locusts make a perfect network of roots, but a few inches below the surface, as anyone who has tried to clear a garden of them can testify. Where the climate is too severe for the locust, the Siberian pea bush (*caragana arborescens*) takes its place. It will endure the severest weather and does not grow too large.

General News Section.

The Railroad Commission of Louisiana has announced the indefinite postponement of its hearing on car service rules, which had been fixed for July 21 at Baton Rouge.

It is reported in Austin that the railroads of Texas have decided to oppose in the courts the state railroad commission's orders requiring them to purchase new cars and engines to the value of $44,000,000.

On July 21 air pressure was reduced and normal atmospheric pressure established in tubes A and B of the Pennsylvania Railroad tunnels under the East River, New York. The compressed air was taken from tubes C and D on July 4.

A meeting of car accountants, local agents and master car builders of the railroads entering Terre Haute, Ind., was held on July 18 to consider a plan to establish a joint bureau for the interchange and inspection of freight cars and also for the local inspection of passenger cars. A committee was appointed to work out and report a plan.

A conference of officers of the roads interested was held at Nashville, Tenn., on July 15, on the subject of consolidating the Memphis Demurrage & Storage Bureau, the Nashville Car Service Association and the East Tennessee Car Service Association. A committee composed of the Southern Railway, the Louisville & Nashville and the Illinois Central was appointed to study the situation and report recommendations.

On the occasion of a wreck at Greenwich, Conn., July 19, blocking three of the four main tracks of the New York, New Haven & Hartford, N. C. Africa, tower man in the East Portchester tower, for eight hours moved all trains in both directions on one track, nearly a hundred of them. Not a mishap occurred and there were no long delays. Mr. Africa has been with the New Haven road for fourteen years. The officers sent to him and to certain other employees commendatory letters.

The Governor of Louisiana has appointed the following as members of a permanent Board of Arbitration to deal with labor difficulties. The headquarters of the board will be at New Orleans. Representing employers: W. B. Thompson, President of the New Orleans Cotton Exchange, and P. F. Kohnke, former President of the New Orleans Board of Trade. Representing employees: H. V. French, of the Order of Railroad Conductors, and Rufus M. Ruiz, member of the Dock and Cotton Council. These four are to select a fifth member to complete the Board.

The Interstate Commerce Commission has appointed, or will soon appoint, seventy examiners to examine the books of railroads. The examination of the accounts of the carriers "is not to be inquisitorial," says the reports. Already requests have been received from three of the largest railroads to have examiners detailed to examine their accounts and methods of bookkeeping. An examination is to be held to obtain eligibles to fill the seventy new positions. Experts in railroad accounting will be preferred. The yearly salary of an examiner will probably be about $2,000.

J. J. Reid, Master Mechanic of the Missouri Pacific at St. Louis, has issued a bulletin to employees in which he says: "In the latter part of 1906 I issued a bulletin to the effect that employees would not be allowed to engage in outside business. On account of the attitude of the public and the importance of our company being free from cause for criticism on the part of the merchants in cities and towns along our line, it is necessary that employees should not engage in business enterprises. For this reason we must ask our employees to determine whether they wish to remain in our employment and observe our regulations, or leave our service and devote their entire time to other business. * * *"

The Interstate Commerce Commission is preparing a list of the private railroads in the United States, and, according to a press despatch, has already found 25,000 of them. The railroad companies have been called upon for information concerning private lines connecting with their tracks and it is said that the Pennsylvania has sent in a list of 7,500. The 25,000 railroads vary in length from a few feet to 40 miles. Most of these little railroads have no names, but one of them, by way of making up for the lack elsewhere, is called "The Lake Superior, Chicago & Galveston." Some tracks have been found of which neither railroad nor adjoining property owners will acknowledge the ownership.

Mr. Ripley on the Santa Fe's "Gigantic Surplus."

E. P. Ripley, President of the Atchison, Topeka & Santa Fe, on July 20 issued a statement in reply to an interview regarding this road by H. C. Barlow, Executive Director of the Chicago Association of Commerce. Mr. Barlow, in his interview, quoted a statement which a brokerage concern had issued regarding the earnings of the Santa Fe for some years and its present condition, referring to the alleged "gigantic surplus" that the road had accumulated, as an argument against an advance in freight rates. The statement issued by Mr. Ripley is as follows:

"The Atchison company has been in existence something over twelve years, during which time its owners (stock and bondholders) have received an average of about 4 per cent. on its capitalization of approximately five hundred millions, and there is a book surplus of about twenty millions, which is equal to about 4 per cent. more. Mr. Barlow thinks this is a wonderful showing and asks what has been done with the 'gigantic surplus.'

"If one of his constituents having a capital of $50,000 had in twelve years been able to take $2,000 out of the business for dividends and have a surplus of $2,000, would he consider such surplus 'gigantic'? The proportions are the same in both cases.

"But in answer to Mr. Barlow's question I may say that this 'gigantic surplus' has every cent of it, and over a hundred millions of borrowed money besides, been put into improvements and betterments in the effort to reduce costs and afford the public better facilities.

"A year ago our critics were asking why we did not spend money faster; why we did not double our investment; why we could not furnish enough track, enough power, enough cars? Now they ask why we did not keep our money? and say that we ought to have foreseen the 'lean period!'

"The facts are that even on the enormous business of last year the margin of profit made by the railroads in general was not large enough for safety, and even with a continuance of heavy traffic an increase in rates would be necessary if the roads are to retain their credit and ability to create the facilities which the public demands.

"The Atchison is surpassed as to its physical condition by few roads in the country, but I could spend three times the amount of the 'gigantic surplus' to excellent advantage in creating facilities for the use of the public and as much more in supplying transportation to regions that badly need it. But with governmental 'regulation,' both state and national, which is wholly directed towards limiting railroad revenues and increasing railroad expenses, it is small wonder that it is hard to borrow money.

"The simple fact is that capital has been content with smaller returns in the railroad business than in any other venture, because of its supposed security. That security has been and is being threatened and railroads have been and are being singled out for a treatment which is called 'regulation,' but which is really persecution. And the public, which is after all the government, will soon have to decide whether it will permit the railroads to earn approximately a return equal to that earned in other enterprises or whether it will operate them by public agencies.

"The present condition under which state and national commissions limit our revenues, order increases in our expenses, meddle with our administration even to the most petty matters—in short, usurp all the functions of the directors except

the raising of money and the meeting of bills—cannot long continue.

"I am not opposing proper government supervision, but we have much more than that, and if it be true, as I devoutly believe, that the railroad should not be in 'politics,' is it not equally true that 'politics' should not be in the railroad? Yet the way to political preferment is to devise some new scheme to harass the railroad and in many places we are subject to the whims and fancies of officials selected not for business ability or common sense, but for purely political reasons.

"Give us a 'square deal'—a chance to live—or else let the government take us; because the present conditions are impossible."

Back to Palestine.

Two years ago we supported Tom Campbell for the governorship of Texas. We therefore have a right to move the reconsideration of the vote by which he was elected.

That was a time of prosperity. The banks of the country were bursting with money. Texas banks alone had $350,000,000 on deposit, and after taking care of home demands, were lending all over the country. New industries were arising all over Texas. The Yoakum railroads were building across the state in two directions and spending 35 millions of dollars right here in the process of construction. The sawmills were running by night as well as by day, and all the 50,000 box cars in Texas were insufficient to haul to market the products of our many industries. The services of laborers were so much in demand that after exhausting the lists of able-bodied persons in the state, employment brokers stood at the gang planks of immigrant vessels eager to hire even foreigners unable to understand working orders. The wage scale for common laborers rose from $1.25 to $1.75 per day, and employers all over the country voluntarily raised the wages of skilled employees. There was so much development and work that there actually existed a labor famine. Mules sold for $500 a pair. Americans produced such a huge volume of food stuffs and clothes stuffs and manufactured articles that after taking care of the wants of America, they had two thousand million dollars' worth of those products left, which they forthwith sent abroad, sold in foreign markets, filling their own pockets with the cash, which in 1907, started right back again into more development and even greater production.

Grand old Texas was right at the head of the procession. She was turning out more yellow pine lumber than any state in the Union; she was raising one-third of the world's cotton, and the price was 12 cents per pound; she built more miles of railroad that year than any state in the Union. If there was a Texan idle it was because he was too lazy to work. There was none such. Industry, widespread and daily expanding, was the order of the day. Grand old Texas was about to break the world's record, and so far as we could see there was no reason why the situation should not have continued indefinitely.

And then came along Tom Campbell. And over in Georgia rose up Hoke Smith. All over the country various other Tom Campbells and Hoke Smiths and Jeff Davises began to see things at night, and in the White House a malcontented man with teeth, while not otherwise resting, was swinging a big stick around his head, breaking up the furniture and bric-a-brac, pausing at intervals merely long enough to kick across the blue parlor a musty old book labeled "Federal Constitution."

Texas was very busy. Texas was making money and making it fast. The railroads made that year more money than ever before in their history, and since we have come to think about it, so did the people. We have since learned that this condition always coincides. We have been challenged to find an era when either was prosperous that the other was not prosperous also; on examination we have not been able to find the period.

But just at this time when every mind was bent on business, along came Tom Campbell. Also along came three other Democratic candidates for governor, all trained politicians. Soprano, tenor, contralto and bass. They all sang a sad ballad in the same key, and the burden of this song was "L's to Pay Down in Texas, Oh, the Corporations Stole Away the Love of My Darling Nellie Gray." Tom's vioce was louder than all the rest, and besides, he was from East Texas.

We confess we had not observed any general ruin. To the contrary we had observed the conditions above stated. But here were four vigilant sentinels right off the watch-towers of Democracy, and swearing that we were completely surrounded; and even allowing for the politician's natural bent to create a one-sided issue against corporations, whose part no other politician is ever foolish enough to take, and which therefore he can always smite without the least danger of being resmitten, nevertheless we thought surely something must be wrong. After a time we were sure of it. We have seen sound and healthy men, falter, fail and go to bed on repeated assurances that they looked sick. Texas and this country at large have just had such an experience.

We had to make a choice among the candidates. We chose Tom Campbell. At about the same time Hoke Smith took charge of Georgia, Jeff Davis went to Wash., (D. C.,) and the wild man in the white house began eating a corporation official every morning raw for breakfast. Within 12 months thereafter every bank in the country had substantially suspended, and every form of business was paralyzed. The sawmills and steel mills shut down, 12,000 miles of new railroad construction were abandoned; 300,000 box cars stood idle on sidings; a million laborers lost their jobs; in Texas every large insurance company, whether writing policies or lending us cheap money, was driven from the state; passenger trains were reduced until the service was diminished by half, money became so tight that bank presidents watched for ten dollar overdrafts with the same deadly fear they used to feel for dynamite; our back doors were besought by beggars and the wage scale of common labor dropped to $1.15 per day and much obliged for that.

We can't stand it. If this is the way to save a country, give us the ruinous conditions of 1906! Georgia has just upset Hoke Smith and his plan of salvation in favor of a little sawed-off man named Brown, who never made a speech in his whole campaign. So far as we can perceive the whole case in Georgia was exactly like that in Texas. Jeff Davis was declined credentials to go as a delegate to Denver from Arkansas, although divorced from his railroad pass and offering to pay his own expenses. Teddy the Terrible has heard from home, and is preparing, as soon as he can get away to go hunting for even more horrible things than Harriman in the jungles of Africa. Is there then no hope for Texas? In deadly earnest, we charge, that the people of Texas and of this country have been betrayed by their governing classes to their own undoing.—*Beaumont Daily Journal.*

Lehigh University's Power of Attorney.

On July 2 the Vice-Chancellor of the University of Liverpool, acting under a power of attorney for Lehigh University, conferred the Lehigh University's degree of Master of Science on Henry Field Parshall. In accepting this duty the Vice-Chancellor wrote to President Henry S. Drinker: "So far as I am aware no precedent or parallel for such an act can be found in the history of British universities. But it is our business to make precedents as well as to follow them."

Culebra Cut Half Completed.

According to reports received at the Washington offices of the Isthmian Canal Commission 47,045,426 cu. yds. has been removed from the great cut at Culebra, while it is estimated that 39,652,822 cu. yds. remain to be taken out. Of the amount already excavated, 12,600,000 cu. yds. was taken out by the old French company from 1881 to 1889, and 10,000,000 cu. yds. by the new French company from 1895 to 1904. Since the American government took charge 18,445,426 cu. yds. has been removed. If the present rate of excavation is maintained, the cut will be completed in about three and a half years.

Lieut.-Col. George W. Goethals, Chairman and Chief Engineer of the Isthmian Canal Commission, has reorganized the administration work on the canal by abolishing the department of excavation and dredging and dividing canal construction work into three divisions, as follows: Atlantic division, in charge of Major William L. Sibert, embracing all territory

north of Tabernilla; Central division, in charge of Major D. D. Gaillard, embracing all territory north of Pedro Miguel to and including Tabernilla; Pacific division, in charge of Acting Division Engineer S. B. Williamson, embracing all territory south of and including Pedro Miguel.

Under the reorganization, each superintendent of construction will have direct supervision not only over the work of excavating but also of transportation and management of the dumps in his district.

Traffic News.

The United States Circuit Court at St. Paul, Minn., has granted the Interstate Commerce Commission's appeal to the Supreme Court of the United States from the order forbidding the enforcement of the order for the reduction of terminal charges on live stock at Chicago.

Traffic officers of the southeastern lines met in Louisville last week to consider the question of advancing rates from the East and from Ohio river crossings to the South and Southeast, and the newspapers say that it was practically decided to make some advances both in class rates and in commodity rates.

The New York State Public Service Commission, Second District, has held that railroad companies may restrict the number of baggage delivery agents to be admitted to their station grounds, but that with this privilege goes the responsibility of seeing that the exclusive agent or agents shall give prompt service at reasonable rates.

The Union Ferry Company, an old-established company running four ferry lines between New York and Brooklyn, has announced that fares on the boats will be at once increased from 2 cents to 3 cents, except for two hours in the morning and two hours in the evening. The business of these boats was seriously diminished by the Brooklyn bridge, and now the Interborough tunnel has reduced it still further.

In Chicago it is reported that the Erie is enjoying a marked increase in tonnage of packing house shipments, and the representatives of competing lines declare that it is the result of the dictation of Harriman and the Armours. For many years the Erie took very little of this business. Mr. Harriman is interested in the Erie and Mr. Armour is interested in the Chicago freight tunnels, with which the Erie has lately made a traffic agreement.

The passenger business of the Chicago, Milwaukee & St. Paul is reported as heavier than at this time last year, but owing to the 2-cent-a-mile rate in many of the states, the earnings from passenger traffic are not as large as they were a year ago. In Dakota, where the road secured an injunction against the enforcement of the 2-cent rate law, the earnings are larger, but in Iowa, Wisconsin, Illinois and Missouri they have fallen off materially.

At Little Rock, Ark., July 16, four railroads, the St. Louis & San Francisco, the St. Louis, Iron Mountain & Southern, the St. Louis & Southwestern and the Chicago, Rock Island & Pacific, entered suits in the Federal Court to prevent the enforcement of the recently enacted 2-cent passenger fare and freight tariff legislation. The three last-named roads assert that since the 2-cent fare law went into effect their lines in Arkansas have been run at a loss.

The New York State Public Service Commission, second district, acting on complaints of a considerable number of shippers, has directed the railroads of the state to cancel their rule requiring every article of freight to be marked, in so far as it applies to bricks, tiles, loose lumber, roofing slate and ice; also to flour and feed when in sacks bearing the name and address of the shipper. The railroads were ordered to give notice to this effect by wire at once to all agents, and to present to the commission a revised rule on August 3.

The Chicago, Rock Island & Pacific, the St. Louis & San Francisco and the Chicago & Eastern Illinois have notified the Western Passenger Association that they favor a fare and a half for the round trip, using the certificate plan, for merchants' excursions this year to New York, Chicago, St. Louis, Kansas City, St. Joseph and Omaha, and they seem disposed to apply the rate independently if the association does not take prompt action. The lines west of Chicago have not made any "merchants' rates" since the 2-cent fare laws were passed.

The Interstate Commerce Commission holds that common carriers may provide eating houses for passengers and employees, and that the property for use of the eating houses may properly be regarded as necessary and intended for use of the carriers in the conduct of their business; but these eating houses must not serve the general public with food prepared from commodities which have been carried at less than the full published rate, and no utensils, fuel or servants employed in serving others than passengers and employees of the carrier as such should be carried at less than tariff rates.

Presidents of the principal trunk lines held an informal conference in New York City on Thursday of last week and again discussed the question of an advance in freight rates which has been under consideration for several months; but no definite action was taken, and it is said that there was an understanding that no general advance should be made before December 1. It was reported that the officers of the Pennsylvania, the Lackawanna, the Reading and the Lehigh Valley were the most decidedly opposed to an immediate advance, and that in this attitude they were at variance with the policy advocated by Mr. Harriman (Erie) and the lines allied with him. A great difference of opinion exists among the railroad officers on the question of what rates can be raised and at what time the change ought to be made.

INTERSTATE COMMERCE COMMISSION.

Export Grain and Flour Rates.

Hecker-Jones-Jewell Milling Co. v. the Baltimore & Ohio. Opinion by Commissioner Prouty.

The complainant is engaged in grinding flour in New York. Its annual business is about 2,000,000 barrels, of which 750,000 are exported. Most of its wheat comes from west of Chicago. At present the domestic rate on grain and products of grain from Chicago to New York is 17½ cents, but if exported the grain takes a rate of 13 cents; flour, 14 cents; and other grain products 15 cents. The mill located at some interior point, which grinds and exports flour, pays from Chicago to New York 14 cents per 100 lbs., while the complainant, who buys grain at the same point west of Chicago, transports it over the line of the defendant, and grinds it at New York and exports the flour, pays 17 cents per 100 lbs. This is unjust. The complainant is not entitled to a 13-cent rate on grain, but is entitled to a 14-cent rate on this grain, as if it were milled at some point west of New York. The service of the railroad company should be considered to begin at Chicago and extend to the delivery of the product at the ship's side, and as it is the character of the product at the ship's side which determines the rate from Chicago to New York, the rate on grain shipped from Chicago to New York, ground there and delivered at the ship's side in the form of flour, should be 14 cents.

Elevator Allowance at the Missouri River.

Traffic Bureau Merchandise Exchange of St. Louis v. Chicago, Burlington & Quincy, and same v. Missouri Pacific, same v. St. Louis & San Francisco, same v. Chicago, Rock Island & Pacific, and same v. Missouri, Kansas & Texas. Opinion by Commissioner Prouty.

Grain in the states west of the Missouri river is usually bought in the country by a country elevator. The grain is weighed and taken into the elevator paid for, and the transaction completed so far as the farmer is concerned. Sometimes the farmer puts his grain into the elevator subject to order for future shipment, and sometimes he sells to what is known as the "track buyer," in which case the grain is delivered directly from the wagon to the car. The owners of country elevators sometimes have no connection with any

terminal elevator, in which case the grain is sold f. o. b. at the country station, or is shipped to some market. As the grain is usually sold on the grade, inspection and weight of the market to which it is shipped it must necessarily be elevated, as it can be weighed in no other way. The defendants have established what they call a transfer charge, or what is generally known as an elevator allowance at the Missouri river, of ¾ of 1 cent per hundred pounds. The railroad tariff provides that this payment shall be made to the elevator performing the services and not to the owner of the grain; the operator of the elevator, at Missouri river points, is almost without exception the owner of the grain. In any case if this is not so, the owner of the elevator will give the owner of the grain the benefit of the ¾ of 1 cent which it gets from the railroad. Therefore, the actual movement of grain to an elevator at Omaha compared with a similar movement to an elevator at St. Louis, Mo., discriminates against St. Louis. Moreover, there is a discrimination against the shipper who does not use an elevator at Missouri river points. The defendants are therefore ordered to no longer pay the elevation allowance at Missouri river.

Rates on Long and Short Leaf Yellow Pine.

Star Grain and Lumber Company et al, v. The Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Harlan.

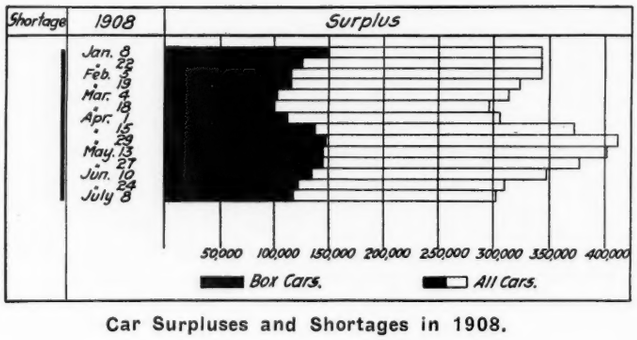
This proceeding was begun by 122 retail lumber dealers in Oklahoma, Kansas, Colorado and Missouri, with yards on the line of the defendant not at junction points. The complaint asks that former rates on yellow pine lumber be restored. The joint rate formerly made by the Atchison, Topeka & Santa Fe and the Cotton Belt was canceled on October 1, 1907, because the Santa Fe would no longer consent to the division of this rate heretofore in force. There is no serious objection to the restoration of through routes and joint rates if the Santa Fe and Cotton Belt can reach a satisfactory division of the rate. The Santa Fe has spent a large amount of money extending its line into the timber country of eastern Texas and western Louisiana. The re-establishment of through routes and joint rates from producing points on the Cotton Belt to local points on the Santa Fe will enable the Cotton Belt to come into direct competition with the Santa Fe, and to take a large share of the lumber direct from these highly competitive yellow pine regions, in which the Santa Fe is an aggressive factor, to haul to competitive local points, which otherwise would be supplied by the Santa Fe alone on a long haul from its own mills. The Act to regulate commerce says that when carriers who have been ordered by the commission to put into effect other routes and joint rates cannot come to an agreement as to the division of these rates, the commission may fix a just and reasonable division. This means that the commission shall take into consideration all the necessary circumstances and conditions that are necessary in judging the situation, and does not imply that the division should be based on a mileage or any other fixed basis. In view of the fact that the Santa Fe not only reaches lumber forests in Southern Texas, but also furnishes the local market which the Cotton Belt desires to reach, no division of rates should be made that does not fully protect the revenues of the Santa Fe so far as can be done in fairness to the Cotton Belt. The rates that are to be re-established vary from 23 cents to 34 cents per 100 lbs. Of this rate the Cotton Belt should receive 10 cents and the Santa Fe the remainder.

Standard Oil Decision Reversed.

The United States Circuit Court of Appeals for the Seventh Circuit, sitting at Chicago, Judge Grosscup delivering the opinion, on July 22 reversed Judge Landis' decision in the Standard Oil case, in which a fine of $29,240,000 was imposed, and remanded the case. The indictment was for alleged unlawful acceptance of rebates from the Chicago & Alton during the period from September 1, 1903, to March 1, 1905. The Circuit Court of Appeals holds that a carrier which establishes a rate may properly be charged with knowledge of it, but that the shipper cannot be so charged, and that Judge Landis erred in not submitting to the jury the question as to whether the Standard Oil Co. knew whether the low rates had been filed with the Interstate Commerce Commission. The Court also holds that Judge Landis erred in ruling that each shipment of a single car of oil was a separate offense. The decision excoriates Judge Landis for imposing this enormous fine on a corporation with a capital stock of only $1,000,000. Judge Grosscup states the reason why the trial court imposed this sentence—the relation of the Standard Oil Company of Indiana to the Standard Oil Company of New Jersey—but says that this question was not before the court. "Can a court, without abuse of judicial discretion, wipe out all of the property of a defendant before the court and all the assets to which its creditors look, in an effort to reach and punish a party that is not before the court? A party which has not been convicted, has not been tried, has not been indicted, even? If so, it is because the man who happens to be the judge is above the law." This criticism of the Circuit Court of Appeals on the action of Judge Landis is as severe as anything of the kind ever visited on a judge in this country.

Car Surpluses and Shortages.

Arthur Hale, Chairman of the Committee on Car Efficiency, has issued statistical bulletin No. 27, giving the summary of freight car surpluses and shortages from October 30, 1907, to July 8, 1908. Mr. Hale says: "There is a further decrease of 9,738 in the number of surplus cars, the total being 303,560 for July 8. Box cars have decreased 5,938 and coal gondolas 5,876. Shop car reports indicate an increase of 2.7 per cent. in the number of bad order cars." The accompanying table shows the summary for 163 roads. The diagram shows car surpluses and shortages during 1908.



Car Surpluses and Shortages in 1908.

Car Surpluses and Shortages, Bi-Weekly, from October 30, 1907, to July 8, 1908, Inclusive.

Date.	Number of roads.	Surpluses. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
July 8, 1908	163	117,174	19,715	124,273	42,398	303,560	289	33	28	168	518
June 24, 1908	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
June 10, 1908	164	135,742	19,078	143,744	51,430	349,994	180	11	23	213	427
May 27, 1908	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
April 29, 1908	159	147,971	24,350	186,742	54,542	413,605	145	42	16	64	267
March 18, 1908	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007
February 19, 1908	161	113,776	30,088	134,217	44,432	322,513	697	141	249	162	1,249
January 22, 1908	161	124,622	27,328	142,338	48,292	342,580	392	132	79	135	738
December 24, 1907	158	87,714	14,740	64,556	42,300	209,310	187	81	191	265	724
November 27, 1907	160	16,246	3,645	10,028	10,429	40,348	11,908	868	2,964	2,224	17,964
October 30, 1907	161	786	600	1,285	1,275	3,946	61,592	3,546	15,987	9,632	90,757

REPORT OF EARNINGS AND EXPENSES OF RAILROADS.

MONTH OF MAY, 1908.

See also issues of July 17 and July 10.

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	All other revenue from transportation.	From operations other than transportation.	Total operat'g revenues.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total operating expenses.	Net operating revenues (or deficit).	Taxes.	Operating income (or loss).
Alabama Great Southern	309	$157,570	$68,087	$26,506	†$429	$251,734	$34,844	$45,292	$6,556	$93,651	$5,796	$186,139	$65,595	$11,430	$54,165
Ann Arbor	301	94,482	31,619	8,737	733	135,571	16,468	25,346	3,000	55,762	3,798	104,374	31,197	11,667	19,530
Buffalo & Susquehanna	372	128,716	13,016	3,517	4,050	149,299	29,469	30,772	1,615	53,672	4,722	120,250	29,049	4,000	25,049
Chicago & Erie	270	204,726	65,663	28,416	2,619	301,424	24,429	33,815	11,183	162,052	7,136	238,615	62,809	6,614	56,195
Chicago, Cincinnati & Louisville	285	52,804	20,444	4,658	1,604	79,510	19,580	18,530	7,015	40,241	4,196	89,562	10.052*	3,250	†13,302
Chicago Great Western	818	358,106	134,158	46,544	3,599	542,407	92,880	122,938	34,008	261,191	26,919	537,936	4,471	17,000	†12,529
Chicago, Indiana & Southern	329	166,035	15,129	4,286	903	186,353	37,067	19,788	7,203	88,488	6,244	158,790	27,563	7,000	20,563
Chicago, Rock Island & Gulf	472	128,423	49,442	11,200	461	189,526	39,445	17,955	5,798	84,088	6,324	153,610	35,916	7,710	28,206
Cincinnati, Hamilton & Dayton	1,038	366,497	124,975	45,072	2,102	538,646	81,169	119,177	21,019	252,866	20,816	495,047	43,599	25,000	18,599
Cincinnati, New Orleans & Texas Pac.	338	443,809	107,849	37,495	†1,362	587,791	57,090	100,309	14,796	203,599	15,653	391,447	196,344	18,000	178,344
Colorado Midland	338	117,797	29,146	17,168	320	164,431	22,805	22,544	10,186	68,618	5,011	129,164	35,267	8,400	26,867
Detroit & Mackinac	344	67,179	19,378	4,871	319	91,738	11,207	14,057	1,878	30,233	2,080	59,455	32,283	6,500	25,785
Detroit, Toledo & Ironton	486	88,898	10,909	7,782	843	108,432	18,836	18,709	2,381	48,331	2,854	91,111	17,321	7,000	10,321
Duluth, Missabe & Northern	275	141,224	24,242	3,712	1,180	170,358	70,826	40,796	534	51,771	7,154	171,081	723*	6,814	†7,537
Fort Worth & Denver City	414	178,551	104,503	13,749	1,006	297,809	68,775	39,327	6,273	119,728	13,294	247,397	50,412	12,817	37,595
Georgia R. R.	307	123,234	59,602	11,413	1,506	195,755	32,200	46,295	7,500	102,359	6,737	195,091	664	1,573	†909
Hocking Valley	347	217,129	59,937	25,251	1,289	303,606	55,895	85,332	7,325	111,669	9,497	269,718	33,888	16,036	17,852
Iowa Central	558	157,331	33,698	10,307	253	201,589	57,534	34,507	8,321	84,003	7,334	191,699	9,890	7,335	2,555
Long Island	392	223,168	552,105	180,667	16,247	972,187	91,664	109,509	13,731	380,806	20,006	615,716	356,471	21,714	334,757
Mason City & Fort Dodge	386	96,057	26,067	8,443	1,967	132,534	35,336	19,804	1,739	61,968	109	118,956	13,578	6,000	7,578
Minneapolis & St. Louis	1,028	171,815	68,802	17,258	1,040	258,915	83,097	45,151	11,447	121,484	10,041	271,220	12,305*	12,482	†25,787
Morgan's La. & Tex. R. R. & S. S. Co.	351	177,776	82,408	18,980	758	279,922	41,715	28,655	6,690	128,345	10,822	216,227	63,695	14,861	48,834
Nevada & California	330	37,910	27,958	7,406	1,298	74,572	11,897	15,865	810	60,733	2,256	91,561	16,989*	25,200	†42,189
Northern Central	460	737,568	161,596	47,694	5,663	952,521	104,055	154,444	11,864	412,966	18,277	701,606	250,915	19,514	231,401
Peoria & Eastern	352	119,336	44,718	15,052	497	179,603	29,350	27,338	4,908	94,683	4,298	160,577	19,026	9,622	9,404
Rutland R. R.	468	123,094	71,964	20,167	4,253	219,478	35,970	29,983	6,112	90,526	4,740	167,331	52,147	6,478	45,669
St. Joseph & Grand Island	319	87,963	27,079	6,498	1,592	123,132	15,165	4,665	5,670	38,495	3,757	67,752	55,380	6,772	48,608
Seaboard Air Line	2,611	814,840	252,597	93,348	35,580	1,196,365	192,355	176,376	43,238	480,766	56,250	948,985	247,380	52,417	194,963
Southern Indiana	351	66,199	14,328	4,986	7,327	92,840	22,536	14,681	2,063	33,703	5,619	78,602	14,238	6,928	7,310
Toledo & Ohio Central	441	180,155	40,885	9,600	596	231,236	40,695	39,328	4,789	90,508	4,329	179,649	51,587	11,898	39,689
Toledo, St. Louis & Western	451	202,556	34,927	17,539	2,395	257,417	26,011	19,926	7,884	97,364	9,746	160,931	96,486	13,000	83,486
West Jersey & Seashore	374	106,978	249,022	44,905	2,553	403,458	64,141	40,646	14,155	181,914	7,828	308,684	94,774	17,112	77,662
Wheeling & Lake Erie	442	245,471	36,813	19,399	2,263	303,946	51,348	72,828	6,823	127,156	14,702	272,857	31,089	19,924	11,165
Wisconsin, Minnesota & Pacific	271	31,588	10,912	2,855	408	45,763	18,726	4,467	282	19,447	43	42,965	2,798	1,831	967
ELEVEN MONTHS OF FISCAL YEAR, 1908.															
Alabama Great Southern	309	$2,080,891	$912,370	$262,887	$4,036	$3,260,184	$456,476	$768,823	$81,218	$1,229,328	$77,085	$2,612,930	$647,254	$120,474	$526,780
Ann Arbor	301	1,212,845	419,855	96,148	11,167	1,740,015	204,881	321,205	31,399	719,909	31,049	1,318,533	421,482	128,333	293,149
Buffalo & Susquehanna	372	1,679,777	173,536	39,137	33,167	1,925,617	400,435	458,516	20,809	719,920	64,887	1,664,567	261,050	44,000	217,050
Chicago & Erie	270	2,736,257	772,128	307,233	23,032	3,838,650	494,731	890,168	122,565	1,869,053	85,064	3,461,581	377,069	129,647	247,422
Chicago, Cincinnati & Louisville	285	667,525	232,184	47,576	6,872	954,157	188,743	239,310	79,257	490,594	44,491	1,042,395	88.238*	36,892	†125,130
Chicago Great Western	818	5,055,162	1,739,091	538,357	49,257	7,381,867	868,741	1,296,643	389,775	3,400,072	294,557	6,249,788	1,132,079	187,000	945,079
Chicago, Indiana & Southern	329	2,258,022	178,569	54,173	13,937	2,504,701	397,631	308,122	80,053	1,042,990	91,191	1,919,987	584,714	79,762	504,952
Chicago, Rock Island & Gulf	472	2,093,867	649,713	123,018	11,779	2,878,377	428,240	279,182	73,863	1,131,177	78,475	1,990,937	887,440	74,137	813,303
Cincinnati, Hamilton & Dayton	1,038	5,153,857	1,583,797	485,497	82,267	7,305,418	1,002,773	1,579,473	232,888	3,303,342	207,080	6,325,556	979,862	284,735	695,127
Cincinnati, New Orleans & Texas Pac.	338	5,485,997	1,432,908	339,340	8,846	7,267,091	614,063	1,789,743	181,838	2,765,294	166,480	5,517,418	1,749,673	198,000	1,551,673
Colorado Midland	338	1,472,980	330,462	225,140	7,207	2,035,789	308,847	265,356	106,123	828,487	56,449	1,565,262	470,527	94,434	376,093
Detroit & Mackinac	344	765,623	263,383	51,130	6,352	1,086,488	135,465	175,406	22,140	386,724	24,997	744,732	341,756	73,788	267,968
Detroit, Toledo & Ironton	486	1,273,803	150,127	76,194	11,722	1,511,846	273,922	378,596	24,664	708,905	30,056	1,416,143	95,703	77,000	18,703
Duluth, Missabe & Northern	275	8,059,453	280,465	35,159	14,203	8,389,280	951,119	858,511	7,205	1,375,782	160,243	3,352,860	5,036,420	336,480	4,699,940
Fort Worth & Denver City	414	2,553,598	1,485,378	159,563	15,549	4,214,088	664,443	533,495	75,041	1,367,992	140,327	2,781,298	1,432,790	124,570	1,308,220
Georgia R. R.	307	1,861,361	702,318	139,550	28,858	2,732,087	404,356	519,436	94,876	1,247,853	80,108	2,346,629	385,458	15,250	370,208
Hocking Valley	347	4,417,919	769,097	181,700	24,426	5,393,142	729,080	1,240,771	77,806	1,666,870	120,951	3,885,472	1,557,670	206,931	1,350,739
Iowa Central	558	2,214,788	438,089	116,885	11,118	2,780,880	347,501	300,222	93,284	1,110,077	86,490	1,937,574	843,306	79,503	763,803
Long Island	392	2,341,373	4,684,709	1,839,548	181,677	9,047,307	1,054,512	1,379,315	170,450	4,602,564	204,871	7,411,712	1,635,595	238,849	1,396,746
Mason City & Fort Dodge	386	1,162,131	375,925	81,204	22,325	1,641,585	173,703	205,848	19,582	695,056	5,889	1,100,078	541,507	66,000	475,507
Minneapolis & St. Louis	1,028	2,381,417	910,194	225,555	21,082	3,538,248	432,601	466,687	103,297	1,349,161	108,811	2,460,557	1,077,691	154,181	923,510
Morgan's La. & Tex. R. R. & S. S. Co.	351	3,250,951	998,429	243,011	35,516	4,527,907	765,623	633,810	93,627	1,856,497	122,590	3,472,147	1,055,760	169,284	886,476
Nevada & California	330	900,227	353,648	83,682	7,335	1,344,892	172,527	149,694	11,553	425,954	29,379	789,107	555,785	83,000	472,785
Northern Central	460	8,837,708	1,923,182	527,431	92,832	11,381,153	1,241,797	2,302,696	146,674	5,110,200	208,339	9,009,706	2,371,447	214,661	2,156,786
Peoria & Eastern	352	1,808,939	602,206	181,788	15,349	2,608,282	258,844	383,552	51,915	1,084,899	49,288	1,928,498	679,784	87,588	592,196
Rutland R. R.	468	1,478,651	915,401	230,265	50,466	2,674,783	423,289	429,538	65,992	1,096,774	60,662	2,076,255	598,528	93,389	505,139
St. Joseph & Grand Island	319	1,088,263	299,767	71,459	25,901	1,485,390	184,638	143,543	57,959	447,482	42,004	875,626	609,764	74,215	535,549
Seaboard Air Line	2,611	9,715,608	3,497,178	891,128	408,156	14,512,070	2,045,451	2,222,246	501,518	5,837,622	464,999	11,071,836	3,440,234	548,083	2,892,151
Southern Indiana	351	997,566	169,896	29,819	285,479	1,482,760	230,199	226,151	18,985	423,564	61,784	960,683	522,077	76,213	445,864
Toledo & Ohio Central	441	3,158,949	558,994	108,048	10,298	3,836,289	539,848	664,785	57,122	1,312,544	54,501	2,628,800	1,207,489	141,794	1,065,695
Toledo, St. Louis & Western	451	2,843,610	487,845	183,495	22,800	3,537,750	437,462	432,828	122,204	1,265,083	124,550	2,382,127	1,155,623	125,000	1,030,623
West Jersey & Seashore	374	1,450,061	3,038,106	510,656	32,519	5,031,342	788,611	614,974	133,196	2,194,599	90,235	3,821,615	1,209,727	188,236	1,021,491
Wheeling & Lake Erie	442	4,056,964	446,348	263,475	158,803	4,925,590	607,719	1,056,944	74,836	2,104,055	121,998	3,965,552	960,038	231,539	728,499
Wisconsin, Minnesota & Pacific	271	384,045	136,318	37,622	6,766	564,751	125,382	46,329	3,231	236,110	1,031	412,083	152,668	22,578	130,090

*Deficit.
†Loss.

National Association of Railway Agents.

The executive committee of the National Association of Railway Agents at a meeting in Chicago on July 18 discussed the proposed advance in freight rates, and passed a resolution to begin a campaign of education among shippers and the public in favor of higher rates. Literature regarding the need for higher freight rates will be circulated and representatives of the Association will invite representatives of shippers to debate with them the subject of freight rates. W. H. Mills, of the Lake Shore & Michigan Southern, Norwalk, Ohio, President of the Association; J. E. Van Deusen, of the Erie, Gowanda, N. Y., Third Vice-President of the Association, and others who were in attendance took part in the discussion. William M. Drury, of the Lake Shore & Michigan Southern, White Pigeon, Mich., Secretary of the Association, read a paper entitled "Shall Freight Rates Be Slightly Advanced or Wages of Railway Employees Materially Reduced?" The thirteenth convention of the Association will be held at Portland, Me., in July, 1909.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Wabash-Pittsburgh Terminal and the West Side Belt have asked permission, through their receivers, to issue $1,654,921 receivers' certificates for various improvements. Of this amount, $204,000 is wanted for the purchase of 12 new locomotives.

CAR BUILDING.

The Chicago, Joliet & Kansas City is asking prices on 15 passenger cars.

The Spokane & International has ordered 100 freight cars from Haskell & Barker.

The Rutland Railroad has ordered one baggage car and two milk cars from the Pullman Company.

The Virginian Railway is said to be figuring on 2,500 freight cars. This item is not yet confirmed.

The Woodward Iron Company, Woodward, Ala., has ordered 10 ore cars from the Pressed Steel Car Co.

The Chicago, St. Paul, Minneapolis & Omaha has ordered one dining car from the Pullman Company.

The Oregon Electric Railway Co., Portland, Ore., has ordered six interurban cars from the Niles Car & Manufacturing Co. The order was placed through W. S. Barstow & Co., New York.

The Atlantic Coast Line is in the market for 50 phosphate cars of 80,000 lbs. capacity. It is also said to be asking prices on 100 ventilated box cars of 60,000 lbs. capacity. The latter item is not yet confirmed.

The Missouri Pacific has placed its second order for repairing 1,000 cars with the American Car & Foundry Co., to be divided between the St. Charles, Mo., the Madison, Wis., and the Memphis, Tenn., plants. The cars to be repaired are of miscellaneous types.

The Chicago & Milwaukee Electric, reported in the *Railroad Age Gazette* of June 26 as being in the market for 10 cars, has ordered from the Jewett Car Co. three combination smoking and baggage, three parlor and three passenger cars. This equipment will be run in three trains consisting of three cars each.

The Yonkers Railroad, as mentioned in the *Railroad Age Gazette* of July 10, has ordered from the St. Louis Car Co. 15 closed vestibule cars. These cars will be 40 ft. long, over all, and 7 ft. 9 in. wide over sills. Seats will be placed longitudinally and covered with canvas-lined rattan. The special equipment includes:

Air-brakes	Allis-Chalmers
Hand-brakes	Peacock
Curtain fixtures	Curtain Supply Co., No. 88 ring fixtures
Motors	General Electric, No. 210
Trucks	St. Louis Car Co., No. 47.

The Delaware, Lackawanna & Western, reported in the *Railroad Age Gazette* of July 3 as being in the market for 100 refrigerator cars, has ordered them from the American Car & Foundry Co., for September delivery. These cars will have a capacity of 60,000 lbs. and will weigh 41,800 lbs. They will be 35 ft. 9½ in. long, 8 ft. 3⅜ in. wide and 7 ft. 7¾ in. high, inside measurements; 39 ft. 11 in. long over drawbars, and 9 ft. 2⅛ in. wide and 13 ft. 5¼ in. high, over all. The bodies will be of wood and the underframes of steel. The special equipment includes:

Bolsters, body and truck	Cast-steel; Gould Coupler Co.
Brakes	Westinghouse
Brake-beams	5-in., 14¾-lb. I-beams
Brake-shoes	Lappin; Am. Brake-Shoe & Fdry Co.
Brasses	Magnus Metal Co.
Couplers	Gould
Doors	Lea Flare Insulation
Door fastenings	Perfection
Draft gear	Miner tandem, 8 x 8 in. springs
Dust guards	Wooden
Journal boxes	McCord
Paint	Sherwin-Williams
Roofs	Murphy inside
Springs	Railway Steel-Spring Co.
Trucks	Barber Roller Bearing
Ventilators	Air circulation through sides and roof

The Intercolonial, as reported in the *Railroad Age Gazette* of July 10, has ordered four second class sleeping cars from Rhodes, Curry & Co., three from the Crossen Car Manufacturing Co., and three from the Silliker Car Co. These cars will seat 72 persons. They will weigh 96,000 lbs., and will measure 62 ft. 8½ in. long and 8 ft. 9 in. wide, inside measurements; 71 ft. 7¼ in. long over buffers, 63 ft. 7 in. long over sills, and 9 ft. 10 in. wide, over all. The distance from top of floor to inside of deck rail will be 7 ft. 7¾ in. The bodies and underframes will be of wood. The special equipment includes:

Bolsters, body	Cast-steel
Bolsters, truck	I. C. R. standard
Brakes	Westinghouse
Brake-beams	Diamond Special
Brake-shoes	Steel back; Am. Brake-Shoe & Foundry
Couplers	Janney
Curtain fixtures	National Lock Washer Co.
Curtain material	Pantasote
Draft gear	Miner tandem
Heating system	Safety Car Heating & Lighting Co.
Journal boxes	McCord; malleable iron
Lighting system	Pintsch mantle lamp
Paint	Green Pullman standard
Platforms	Standard Coupler Co.
Seats	I. C. R. standard
Seat covering	Morrocoline
Side bearings	Chicago Railway Equipment Co.
Springs	I. C. R. standard; Montreal Steel Works
Trucks	I. C. R. standard
Vestibules	Pullman (wide)
Vestibule diaphragms	Ajax
Vestibule trap doors	Dayton

RAILROAD STRUCTURES.

BUTTE, MONT.—Work was begun July 13 on a frame freight shed for the Chicago, Milwaukee & St. Paul. The structure, located at the intersection of the Butte, Anaconda & Pacific tracks and Montana street, will be 48 ft. x 250 ft.

CALUMET, MICH.—The Duluth, South Shore & Atlantic is having plans prepared for a new passenger station. It will be a two-story structure of brick and stone; ground dimensions, 115 ft. x 35 ft. It will cost about $20,000.

CANADIAN, TEX.—The Atchison, Topeka & Santa Fe has awarded to C. A. Fellows, of Los Angeles, Cal., the contract for a number of terminal buildings, including machine shops and roundhouse. The contract price is $150,000.

DEPEW, N. Y.—The New York Central & Hudson River has let a contract to B. I. Crooker, Builders' Exchange, Buffalo, N. Y., for building a brick addition, 75 ft. x 161 ft., to the boiler shop of the locomotive repair plant. The structure will cost $25,000.

EAST SYRACUSE, N. Y.—The general contract for a 20-stall roundhouse to be built for the New York Central & Hudson River has been awarded to Marcellus & Ballard, Oneida, N. Y.

EDMONTON, ALB.—The Dominion government has granted a subsidy to the Calgary & Edmonton, which is leased by the Canadian Pacific, for the construction and completion of a high level bridge over the Saskatchewan river to connect Strathcona, Alb., and Edmonton. The subsidy is 15 per cent. of the total cost of the bridge, but is not to exceed $100,000.

FORREST CITY, ARK.—The contract for a new passenger depot

will be awarded by the Chicago, Rock Island & Pacific within a few days.

GARY, IND.—The Chicago, Lake Shore & Eastern has let the general contract to the Hill Construction Co., 171 La Salle street, Chicago, for a one-story car repair shop to be built at Gary, Ind. The structure will be 94 ft. x 300 ft., of brick and steel construction.

HATTIESBURG, MISS.—A site is being located, it is said, for a passenger station to be built by the New Orleans & Northwestern, at a cost of $125,000. It is expected to have the station ready for use this year.

JACKSONVILLE, ILL.—Officials of the Chicago & Alton, in a conference with the Jacksonville Business Men's Association on July 17, proposed the building of a union passenger station in conjunction with the Chicago, Peoria & St. Louis and the Burlington. Tentative plans have been prepared for the proposed structure, calling for an expenditure of $25,000 by the Alton and a proportionate amount by the other roads interested.

KENORA, ONT.—After almost two years of difficult work the third and last pier for the Canadian Pacific bridge over the east branch of the Winnipeg river has been finished. The bridge is being built in connection with the double-tracking of the line from Winnipeg, Man., east to Fort William, Ont., 427 miles. (R. R. G., March 13, p. 396.)

LURAY, VA.—The contract to build a passenger station for the Norfolk & Western, to replace the structure recently burned, has been awarded to John P. Pettyjohn & Co., Lynchburg, Va. The building will cost $12,500.

PITTSBURGH, PA.—See Wabash-Pittsburgh Terminal under Railroad Construction.

VANCOUVER, B. C., CAN.—The Vancouver, Westminster & Yukon has been granted a Dominion subsidy of $200,000 for the construction of a railroad bridge over Burrard inlet.

WEST ALBANY, N. Y.—The New York Central & Hudson River has given a contract to Lynn B. Milliken, Buffalo, N. Y., for a one-story, steel-frame, erecting shop to cost $200,000. The structure will be 442 ft. x 100 ft.

SIGNALING.

The joint committee on Interlocking and Block Signals of the American Railway Association, F. C. Rice, Chairman, met at Chicago last week and inspected the Rowell-Potter automatic train stop, an experimental installation of which has been made on the Chicago, Burlington & Quincy near Aurora.

The Union Switch & Signal Company have taken a contract to equip with automatic block signals seven miles of the single-track line of the Rochester, Syracuse & Eastern, an electric road. Alternating-current track circuits will be used. The installation is between Port Byron and Auburn. Both rails of the track will be used for the return of the propulsion current.

The Union Switch & Signal Company has supplied to the Delaware, Lackawanna & Western materials for 13 miles of block signals to be erected on the single-track line of the Passaic & Delaware division, from the junction to Bernardsville. The signals will be Style B, electric-motor semaphores, with primary batteries. The D., L. & W. is erecting near its Hoboken terminus two electro-pneumatic plants, one at Grove street of 35 levers and one at the west end of the tunnel with 23 levers.

SUPPLY TRADE NOTES.

John R. Morgan, formerly Chief Engineer of the Morgan Engineering Co., Alliance, O., has been appointed General Manager of the Calumet Engineering Works, Harvey, Ill.

The Pressed Steel Car Co., Pittsburgh, Pa., will build a one and two-story warehouse at Pittsburgh to cost $30,000. The general contract for the structure has been awarded to A. & S. Wilson, Pittsburgh.

H. S. Moulton, recently connected with the Empire Steel & Equipment Co., New York, has resigned to become Vice-President of the Standard Wool Cleansing Co., New York. Mr. Moulton has taken a part interest in this company.

W. A. Converse, Assistant Secretary and Chemical Director of the Dearborn Drug & Chemical Works, Chicago, has been made Secretary and Chemical Director; Ralph R. Browning, Assistant Treasurer, has been appointed Treasurer.

The American Diamond Blast Co., New York, will establish a department devoted to railroad work such as scale cleaning on bridges, water tanks, water towers, locomotive tanks, dome covers and all work where a sand blast is necessary.

The Buffalo, Lockport & Rochester Rolling Stock Co., Niagara Falls, N. Y., has been incorporated to make railroad equipment. The incorporators are: S. F. Carr, R. D. Moore and W. M. Wheeler, Buffalo, N. Y. Capital stock, $50,000.

E. H. Smith, heretofore Master Mechanic of the Boston & Albany at Allston, Mass., has been appointed Railroad Representative of the American Steam Gage & Valve Manufacturing Co., Boston, Mass. His headquarters are at 220 Camden street, Boston.

The European Brake Shoe Co., West Orange, N. J., has been incorporated with $50,000 capital stock, to manufacture railroad appliances. The incorporators are: William D. Sargent, George M. Judd and Edward H. Fallows, 32 Cortlandt street, New York.

The National Brake & Electric Co., Milwaukee, has prepared plans for the erection of an addition to its Larkin street plant to accommodate new core and annealing ovens. The building will be of brick and is estimated to cost $10,000. Work will be begun without delay.

The Buckeye Steel Castings Co., Columbus, O., has awarded to the Mt. Vernon Bridge Co., Columbus, O., the contract for building a new machine shop at its Parsons avenue plant in that city. The building will be 300 ft. x 60 ft., of steel construction and will cost $25,000.

C. V. De Jong, Superintendent of Shops of the Chicago Railways Co., has been appointed General Manager of the Danville Car Co., Danville, Ill., succeeding Henry F. Vogel, whose appointment to the Presidency of the Natural Power Co., Kirkwood, Mo., was noted in our issue of July 3.

The Independent Pneumatic Tool Co., Chicago, reports that it has received more orders for the Thor pneumatic tools and appliances during the first two weeks of July than during any similar period since last October. The company has increased its force of workmen at its Aurora, Ill., plant.

Joseph W. Blabon, formerly Freight Traffic Manager of the Chicago & Alton, has gone to the Chicago office of the American Car & Foundry Co., New York. Mr. Blabon, before his connection with the Chicago & Alton, was Purchasing Agent of the Great Northern, and later Western Traffic Manager and Fourth Vice-President of the same road.

The Western Steel Car & Foundry Co., Chicago, is figuring on a paint shop, 540 ft. x 140 ft., an addition to a steel shop and an addition to an erecting shop, in connection with the plant at Hegewisch, Ill. The paint shop will be of steel and reinforced concrete, and the two additions will be of steel and galvanized iron. The cost of the improvements planned is estimated at $200,000.

Bids will be received (Circular No. 452) until July 20, 1908, by the Isthmian Canal Commission, Washington, D. C., for the supply of dynamite, blasting caps, fuses, connecting wire, insulating tape, insulating paint, blasting mats, steel, tobin bronze, muntz metal, yellow metal, copper, brass, brass and copper tubing, lock washers, metallic packing, lace leather, drain tile, duplex chain blocks, etc.

The Scully Steel & Iron Co., Chicago, is having plans prepared for a new warehouse at Ashland avenue and the river. The building will be one story high, 231 ft. x 631 ft., of steel construction and equipped with traveling cranes. About 1,600 tons of structural steel and iron will be required for the building of this structure, which is to cost approximately $150,000. Bids will be asked in about two weeks.

E. J. Winslow, the manufacturer of Winslow hydro-clad concrete battery vaults and chutes, has moved from his old plant

at Grand Crossing, Ill., to a larger and better equipped factory at Blue Island, Ill. The Railway Specialty & Supply Co., Chicago, which is the selling agent for this material, calls attention to this change, as the impression that the original Hydro-clad vault is no longer in the market seems to have gained some publicity.

J. W. Lowell, Eastern Manager of the Fort Wayne Foundry & Machine Co., Fort Wayne, Ind., has been appointed also Eastern Manager of the Bass Foundry & Machine Co., of Fort Wayne, which has taken larger New York offices in the American Surety Building, 100 Broadway. John H. Bass, of Fort Wayne, is President of both companies. The two New York offices being combined, Mr. Lowell now handles both steam engines and boilers and gas engines and gas producers.

TRADE PUBLICATIONS.

Bolts and Nuts.—The 1908 catalogue of the Russell, Burdsall & Ward Bolt & Nut Co., Portchester, N. Y., shows various styles of bolts and nuts used by large consumers, which the company is prepared to supply. The book has a large number of half-tone illustrations of nuts, bolts, screws, rivets, etc.

Ball Bearings.—The Hess-Bright Manufacturing Co., Philadelphia, Pa., has issued a catalogue giving some valuable information regarding ball bearings in general, with particular attention to the Hess-Bright product, as used in connection with both light and heavy machinery. This catalogue supersedes all editions bearing a lower number than Form 580.

Electric Railway at Dalny.

Plans for the electric railway which is to be built by the South Manchuria Railway Co. are nearing completion, and bids for the supply of materials will shortly be asked. The estimated cost will be about $1,000,000, and the chief electrical engineer of the company is expecting to visit the United States to study the latest street railway practice. Further particulars may be obtained from the Bureau of Manufactures, Washington, D. C.—*Consular Report.*

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

D. D. Hull, Jr., has been appointed General Counsel of the Virginia & Southwestern, with office at Bristol, Va.

W. R. Storrs has been appointed Secretary and Treasurer of the Raleigh & Charleston, with office at Richmond, Va., succeeding C. T. Williams.

John A. Lusk has been appointed a member of the Atlanta Railroad Commission, to serve out the unexpired term of Major John G. Harris, deceased.

W. S. Watson has been appointed Secretary and Treasurer of the Stephenville, North & South Texas, with office at Stephenville, Tex., succeeding J. M. Gage.

S. J. Dill, Vice-President of the Youngstown & Southern, has resigned to become General Manager of the Elmira Water, Light & Railroad Co., which controls all the public utilities and electric roads of Elmira, N. Y.

D. B. Hanna, Third Vice-President of the Canadian Northern, has been made also President of the Niagara, St. Catharines & Toronto, succeeding F. Nicholls. J. D. Morton has been elected Vice-President, succeeding E. R. Wood. A. J. Mitchell has been elected Secretary and Treasurer, succeeding Aemilius Jarvis.

Operating Officers.

J. G. Scott, General Manager of the Quebec & Lake St. John, has resigned.

W. J. Uren has been appointed Chief Despatcher of the Canadian Pacific at Winnipeg, Man., succeeding E. G. Trump.

E. Taylor, Acting Chief Train Despatcher of the Beaumont division of the Atchison, Topeka & Santa Fe, will resume the duties of Trainmaster. H. T. Flint, Despatcher, has been appointed Chief Train Despatcher.

W. A. Card has been appointed Assistant Superintendent of the Galesburg division of the Chicago, Burlington & Quincy, with headquarters at Galesburg, Ill.

W. H. Whalen, Superintendent of the Northern Wisconsin division of the Chicago & North-Western, has been appointed Superintendent of the Southern Pacific at Dunsmuir, Cal.

G. Hodge, Superintendent of Terminals of the Canadian Pacific at Montreal, Que., has been appointed Superintendent of District 3, Ottawa and Quebec sections, with office at Montreal. J. R. Gilliland succeeds Mr. Hodge.

E. I. Bowen, the recently appointed Superintendent of the Delaware and Jefferson divisions of the Erie, began railroad work on the Erie in 1890 as Assistant Roadmaster of the Allegheny division. In 1896 he was made Roadmaster, and three years later was made Assistant Division Engineer. In 1903 he was made Trainmaster of the Allegheny division, and in January, 1905, was appointed Superintendent of the Allegheny and Bradford divisions, which position he held until his recent appointment.

J. M. Davis, the recently appointed General Superintendent of the Oregon Short Line and the Southern Pacific Lines East of Sparks, Nev., was born in 1871 at Palestine, Tex. He began railroad work as freight brakeman on the San Antonio & Aransas Pass at Yoakum, Tex., in 1889. Two years later he went into the Superintendent's office of the Gulf, Colorado & Santa Fe as clerk and stenographer. In 1895 he went to the Great Northern as clerk in the office of the General Manager of the Eastern Minnesota. By 1898 he had become Assistant Superintendent of the Fergus Falls division, and in August of the same year was made Superintendent of the new Breckenridge division. In 1900, he was appointed Superintendent of the Erie & Wyoming Valley, now part of the Erie. He stayed with the Erie until 1903, when he was appointed Superintendent of the Eastern division of the Great Northern. The next year he was transferred, as Superintendent, to the Dakota division, and then, in 1905, to the Minot division. On July 1, 1905, he was promoted to Assistant General Superintendent of the Central district. On December 31, 1906, he was made Assistant General Superintendent of the Oregon Short Line and the Southern Pacific Lines East of Sparks, Nev. From December 15, 1907, until his recent appointment he was Acting General Superintendent.

J. M. Davis.

Traffic Officers.

H. J. Snyder, General Agent of the Mexican Central at San Francisco, Cal., will hereafter represent both that road and the National Railroad of Mexico.

J. B. Hendricks has been appointed Traveling Agent of the Delaware, Lackawanna & Western at St. Louis, Mo. W. J. Keane has been appointed Contracting Agent at St. Louis.

R. M. Warner, Commercial Agent in charge of freight traffic of the Missouri & North Arkansas, has been appointed General Freight Agent, with headquarters at Eureka Springs, Ark

T. F. Harrington, who recently resigned as General Agent of the Passenger Department of the Wabash at St. Louis, Mo., is now General Southwestern Agent of the Cunard Steamship Co.

J. B. Gibson, chief clerk at the commercial agency of the

Chicago, Rock Island & Gulf at Dallas, Tex., has been appointed Traveling Freight Agent at Houston, Tex., succeeding J. C. Dillard.

W. W. Masters, Soliciting Freight Agent of the Norfolk & Western at Cincinnati, Ohio, has been appointed Commercial Agent at Indianapolis, Ind., succeeding A. M. Dudley. E. L. Strawser succeeds Mr. Masters.

E. Olson has been appointed Traveling Passenger Agent of the Canadian Pacific at St. Louis, Mo., succeeding W. S. Merchant, resigned. G. B. Coombe has been appointed Freight and Passenger Agent at Calgary, Alb.

H. B. Tooker, General Freight and Passenger Agent of the Nevada Northern, has resigned. The traffic department for the present will be under the jurisdiction of the General Manager, to whom all correspondence should be addressed.

F. W. Smith, Assistant General Freight and Passenger Agent of the New York, Ontario & Western, has resigned, effective August 1. He has been appointed to represent the Trunk Lines Association on the Uniform Classification Committee.

E. Tatom, District Passenger Agent of the Southern Railway at Nashville, Tenn., has been appointed Passenger Agent of the Tennessee Central, with headquarters at Nashville. C. H. Saunders, Local Agent of the Southern Railway and the Illinois Central at Nashville, has been appointed General Agent of the Tennessee Central at Nashville.

T. J. Kizer, Commercial Agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Toledo, Ohio, has been transferred, as Commercial Agent, to Terre Haute, Ind., succeeding W. V. Carroll, resigned. C. W. Smith succeeds Mr. Kizer. M. B. Toney has been appointed Commercial Agent at Nashville, Tenn., succeeding W. M. Pennington, resigned.

Engineering and Rolling Stock Officers.

J. H. Munro has been appointed Locomotive Foreman of the Canadian Pacific at Muskoka, Ont.

Guy Scott, Engineer of Maintenance of Way of the Pennsylvania Lines West at Richmond, Ind., has been transferred, as Engineer of Maintenance of Way, to Toledo, Ohio.

William Baird, General Car Inspector of the Chicago, Burlington & Quincy, has been appointed Shop Superintendent at the Plattsmouth, Neb., shops, succeeding H. J. Helps, resigned.

W. Hamilton, Acting Locomotive Foreman of the Grand Trunk at Palmerston, Ont., has been appointed Locomotive Foreman at Stratford, Ont., succeeding J. A. Mitchell, resigned. I. Jeffries succeeds Mr. Hamilton.

The headquarters of C. E. Fuller, who has been appointed Superintendent of Motive Power and Machinery of the Union Pacific, succeeding W. R. McKeen, Jr., will be at Omaha, Neb., instead of San Francisco, Cal., as stated in these columns last week.

S. W. Hodgin, the recently appointed Engineer of Maintenance of Way of the Pennsylvania Lines West at Cambridge, Ohio, was born December 19, 1875, at Richmond, Ind. He graduated from Purdue University in 1899 and began railroad work in that year on an engineer corps of the Pennsylvania Lines West. In 1903 he was made Assistant Engineer at Cambridge, Ohio. During the years from 1904 to 1908 he was Assistant Engineer at Cambridge, Ohio; at Louisville, Ky.; at Chicago, and finally at Pittsburgh, Pa., where he remained until he was made Engineer of Maintenance of Way at Cambridge.

S. A. Jordan, who was recently appointed Engineer of Maintenance of Way of the Baltimore & Ohio at Baltimore, Md., was born in 1872 at Hicksville, Ohio. He graduated from the Ohio Normal University and began railroad work in 1898 with the Baltimore & Ohio as draftsman in the bridge department. In 1902 he was made Assistant Engineer on the engineer corps of the Cleveland division, and the next year was made Assistant Engineer of the Wheeling division, later being transferred to the Butler division. In December, 1903, he was made Division Engineer of the Wheeling division, and in 1904 was transferred, as Division Enginer, to the Cleveland division. In September, 1907, he was again transferred, this time to the Philadelphia division, where he remained until his recent appointment as Engineer of Maintenance of Way.

OBITUARY.

C. J. L. Meyer, the first President of the Northwestern Union Railroad, now a part of the Chicago & North-Western, died on July 18 at Trinity Hospital, Milwaukee, Wis.

A. D. Hengerer, Contracting Agent for the Lake Shore & Michigan Southern, the Cleveland, Cincinnati, Chicago & St. Louis, and the Lake Erie & Western, died July 19, at Buffalo, N. Y. He had been Contracting Agent since February, 1907.

D. S. Dockstadter, formerly General Foreman of the Car Department of the Erie, died July 13, at Meadville, Pa. Mr. Dockstadter was 78 years old. He began railroad work in 1862 on the Atlantic & Great Western, now part of the Erie. He was Master Car Builder for the Erie for 20 years, and in 1887 was made General Foreman of the Car Department. In 1896 he retired.

Aniceto Garcia Menocal, who has done important engineering work for the United States government for many years, died on July 20 in New York. He was born in Cuba 72 years ago and graduated from the Rensselaer Polytechnic Institute in the class of 1862. He was engineer in the department of public works in New York from 1870 to 1872, and was later Chief Engineer for the government for surveys to establish the practicability of ship canals through Panama and Nicaragua. He was, for a time, Chief Engineer of the Maritime Canal Co., of Nicaragua. In 1887 he prepared plans and estimates of cost for a ship canal through Nicaragua. He was a member of the board sent to the Philippines in 1900 to prepare plans for naval stations on the Islands, and has more recently been doing work in Cuba. He was a member of the American Society of Civil Engineers and a Chevalier of the Legion of Honor.

Railroad Construction.

New Incorporations, Surveys, Etc.

ABERDEEN & TOMBIGBEE VALLEY.—Building from Okolona, Miss., southeast to Pickenville, Ala., 65 miles. Contract recently let to S. M. Bush, of Memphis, Tenn., for the last section from the Buttahachie river south to Columbus, Miss., 14 miles. (R. R. G., May 8, p. 654.)

ALGOMA CENTRAL & HUDSON'S BAY.—Subsidy granted by the Dominion government for a line from Michipicoten Harbor, Ont., north towards the main line of the Grand Trunk Pacific, not to exceed 50 miles.

ATLANTIC & ST. ANDREWS BAY.—The extension from Youngstown, Fla., south to Panama City, 25 miles, has, it is said, been finished. (R. R. G., March 13, p. 389.)

BALTIMORE & OHIO.—Contract, it is said, has been let to Charles A. Sims & Co., Philadelphia, Pa., to build four miles of single-track road in Georgetown, D. C., and to boundary of the District of Columbia. The line will be part of the Washington & Western Maryland, owned by the B. & O., which was chartered some years ago and which has done some work on the line. Congress recently granted an extension of the charter for that part of the line in the District of Columbia. The road now must be built and in operation by June, 1909. It is to comply with this requirement that the contract has been let. The new line is to serve local traffic in that part of the District and to provide terminal facilities in and around Georgetown, where the Baltimore & Ohio has bought considerable property for freight yards and switching tracks. It is ultimately intended to operate the line in connection with the Metropolitan Southern, a branch of the Baltimore & Ohio from Linden, in Montgomery county, Md., to the Potomac river. This is finished from Linden to Chevy Chase. A link five miles long is to be built to join this with the Washington & Western Maryland at the District line.

BEAVER VALLEY & NORTHWESTERN.—Surveys are being made and rights of way secured. The line is projected from Gage, Okla., on the Atchison, Topeka & Santa Fe, west to Beaver, about 65 miles. It is intended ultimately to extend the line

northwest to a connection with the Atchison, Topeka & Santa Fe in Kansas. J. W. Webb, of Beaver, is President; W. M. Holt, of Gage, Vice-President; F. Laughrin, of Beaver, Treasurer, and C. H. Holmes, of Gage, Secretary.

Baltimore & Washington (Electric).—Intends, it is said, to build a part of its line from Washington, D. C., to Sandy Spring, Md., 14 miles. W. A. Mellen, General Manager, Washington, D. C. (June 19, p. 208.)

Bessemer & Lake Erie.—Construction work on the double-tracking north of Mercer Junction, Pa., which was abandoned last fall, has, it is said, been resumed. Work will be pushed and it is expected that by fall the company will have a double-track all the way to Conneaut Harbor.

British Columbia (Electric).—Bids were received July 23 for building a section of the Chilliwac-Westminster line between Cloverdale, B. C., and Abbotsford, 26 miles.

Burk's Falls & French River.—The Dominion government has granted a subsidy to this company to build a line from Burk's Falls, Ont., north to French River, not to exceed 85 miles.

Canadian Northern.—Ballasting is being pushed on the line between Brandon, Man., and Regina, Sask., and it is expected that the line will be opened for traffic during August, giving a direct line from Winnipeg, Man., to Prince Albert, Sask.

Canadian Northern Ontario.—Subsidy granted by the Dominion government for a line from Sutton Junction, Ont., to Hatton Mines, not to exceed 30 miles.

Canadian Pacific.—Dominion subsidies have been granted the Esquimalt & Nanaimo for a line from a point near French Creek, B. C., to Sandwick, not exceeding 41 miles, and for a line from Sandwick northwest to Campbell River, not exceeding 38 miles. Also for an extension of the Esquimalt & Nanaimo from Cowichan Bay, B. C., to Cowichan Lake, not to exceed 24 miles.

Surveyors, it is said, are making the final locations for the projected line between Calgary and Lethbridge, Alb.

Chicago, Burlington & Quincy.—Newspaper reports that this road will soon begin building a new line through central Wyoming from Guernsey to Thermopolis are incorrect. The Burlington has no intention of building any new line at present or in the immediate future.

Chicago, Milwaukee & St. Paul.—It is said that the final cost of the Pacific coast extension will be $77,000,000, or $5,000,000 more than the original estimate. This addition is due to a change of route which has made a considerably lower grade. (R. R. G., May 27, p. 461.)

The bridge across the Blacktail river in Montana was completed on July 14. The line from Chicago to Butte, Mont., will, it is expected, be completed by July 25.

Chicago, Ottumwa & Western.—Engineers, it is said, have started the preliminary work for this line, to be built from Ottumwa, Iowa, northwest via Hamilton to Des Moines, 85 miles. The company has $3,000,000 capital, and its officers are: J. T. Avery, President and Secretary, of Hiteman; S. P. Pascoe, Vice-President; A. A. McGarry, Treasurer, and John A. Nelson, Chief Engineer, all of Hamilton.

Cincinnati, Kentucky & Virginia.—An officer writes that this company has filed incorporation papers in Kentucky to build a line from a point on the Ohio river near Cincinnati, Ohio, southeast to the Virginia state line, 160 miles. Surveys made on 40 miles. There will be a large number of tunnels and bridges. Harold R. Stone, President; T. C. Bayland, Vice-President, 211 Railway Exchange building, Chicago; W. D. Gerber, Chief Engineer, Yale, Bath county, Ky. (June 19, p. 208.)

Colorado & Southern.—It is said that this company will soon begin the extension of its line from Wellington, Colo., northeast to Cheyenne, Wyo., about 28 miles, with the intention of completing work by July, 1909, when the present traffic agreement with the Union Pacific is, it is said, to expire. This extension will give the Colorado & Southern a through line from Orin Junction, Wyo., to Galveston, Tex.

Colorado, Columbus & Mexican.—Incorporated in New Mexico with $5,000,000 capital stock to build from Columbus, N. Mex., north to Farmington, about 456 miles. It is said that the road will run into El Paso, Tex., over the El Paso & Southwestern tracks from Columbus; also that Salt Lake City, Utah, is the final destination.

Colorado, Texas & Mexico.—Building from Mangum, Okla., south to Abilene, Tex. A number of branches are also projected. Contracts, it is said, for some of the work are also to be let at once in 25-mile sections. (R. R. G., May 27, p. 747.)

Denver & South Platte (Electric).—Contract said to be let to W. J. Coursin, of Pittsburgh, for an extension from Denver, Colo., to Roxbury Park and Colorado Springs, 25 miles.

Denver, Laramie & Northwestern.—It is said that about 15 miles has been graded since May 2, also that construction work will reach Fort Collins, Colo., by December, and Laramie, Wyo., by the following spring. The road is to be about 1,400 miles long, running from Denver, Colo., to Seattle, Wash. (R. R. G., May 15, p. 687.)

Des Moines & Sioux City.—E. G. Kelley is said to have started location surveys for this proposed line. The projected route is from Des Moines, Iowa, northwest via Perry, Jefferson and Lake City. A. O. Anderson, Secretary, Lake City.

El Reno Interurban.—Incorporated with $25,000 capital to built an electric line from El Reno, Okla., via Oklahoma City, to Shawnee; also from El Reno to Chickasaw, El Reno to Clinton, and El Reno to Enid, about 250 miles in all. J. M. Maney, Oklahoma City; H. K. Schafer and H. Dittner, El Reno, are directors.

Esquimalt & Nanaimo.—See Canadian Pacific.

Georgia Southwestern & Gulf.—Organized in Georgia to build from Albany, Ga., southwest via Donaldsonville to Marianna, Fla., thence to St. Andrews Bay, 160 miles, with a connecting line from Dawson, Ga., south to a point on the main line about 30 miles west of Albany. W. M. Legg, President, Macon, Ga.; J. R. Mercer, Vice-President, Dawson.

Gould Southwestern.—An extension, it is said, is to be built by this company with its own men from the present terminus at Weber, Ark., southwest to Star City, 40 miles. Right of way and capital secured. The company now operates a 10-mile freight line from Gould, Ark., to Weber.

Grand Trunk Pacific.—Additional sub-contracts have been let by Foley, Welch & Stewart on their 100-mile contract eastward from the Pacific Coast terminus at Prince Rupert, B. C., as follows: John Albi, Spokane, Wash., 4 miles; Antonio Filigno, Spokane, 1 mile; D. A. Rankin, Spokane, Wash., 2 miles.

The grading on the section east of Edmonton, Alb., has been completed, and the construction force has moved westward to begin on the section between the Saskatchewan and Macleod rivers. Work is also being concentrated on the 115 mile section towards the Rocky mountains. Foley, Welch & Stewart have sublet portions of the contract, and it is understood that the grading will be finished in the fall. On July 15 track laying had been completed to the Battle river. The bridge over the Battle river and the fill at Clover Bar, are the largest undertakings between the Great Lakes and the Rockies.

Kentucky & Ohio River (Electric).—Additional contracts, it is said, are to be let for work on this proposed interurban line from East Cairo, Ill., east to Paducah, Ky. Contracts for building 38 miles let to Simms Brothers, of Thebes, Ill., and for building 18 bridges to Forbush & Stotlar, of Benton, Ill. (June 19, p. 209.)

Lac Seul, Rat Portage & Keewatin.—The Dominion government has granted a subsidy to this company for a line from a point at or near Kenora, Ont., north to a connection with the main line of the Grand Trunk Pacific, 18 miles.

Laramie, Hahn's Peak & Pacific.—It is said that a contract has been awarded for clearing the timber from about five miles of the right of way on the extension from Centennial, Wyo., south to Walden, Col. (R.R.G., Apr. 24, p. 591.)

Lexington & Eastern.—Announcement is said to have been made that this road will be extended from Jackson, Ky.,

southeast through Perry, Knott and Fletcher counties, to the Elkhorn coal fields.

METROPOLITAN SOUTHERN.—See Baltimore & Ohio.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—On the extension from Brooten, Minn., northeast to Duluth, 189 miles, of which 49.6 miles was finished last year, additional grading crews have been put to work on the section from Royalton, Morrison county, north to Mooselake. It is expected to finish the line to Mooselake, 135 miles from Brooten, this fall. Track has been laid to within a few miles of Pierz, which is 15 miles northeast of Royalton. Foley, Welch & Stewart are the contractors. (R. R. G., April 24, p. 591.)

NASHVILLE & HUNTSVILLE.—Work, it is announced, is to be started at once by W. J. Bennett & Co., contractors, on the first section of this proposed line from Nashville, Tenn., south to Huntsville, Ala., 105 miles. T. W. Pratt, Vice-President, Huntsville, Ala. (June 19, p. 209.)

NEW YORK, NEW HAVEN & HARTFORD.—It has been announced that this company will spend $1,000,000 on three new trolley lines. The contracts are to be let at once and work will begin on all three lines this fall. One of these is the one mentioned in the *Railroad Age Gazette* of July 17, from Hartford, Conn., south to Middletown. Another will run from Hartford northwest to Bloomfield and the third from Willimantic northwest to South Coventry.

OREGON RAILROAD.—A franchise was asked of the city council of Pendleton, Ore., on July 11, for a system of electric lines radiating from Pendleton. The right to use certain streets of Pendleton is asked by James H. Qwinn, Pendleton, as trustee.

REDLANDS & YUCAIPE (ELECTRIC).—An officer writes that this company has given a contract to M. H. French, General Manager of the Redlands Construction Co., and work is now under way on an electric line from Redlands, Cal., via Yucaipe to Oak Glenn, 22 miles. Track has already been laid on part of the line. J. M. Neeland, of the Pan-American Railroad, is President, and W. D. Larabee, Chief Engineer, both of Los Angeles, Cal.

SOUTHERN PACIFIC (MEXICO).—An officer writes that on the new line being built in Mexico from Guaymas down the west coast to Guadalajara, 730 miles, track laying from Guaymas south to the north bank of the Culiacan river, Sinaloa, was finished on June 30. It is expected to finish the bridge over the Culiacan river this month, and to open for operation the first 340 miles from Guaymas south to Culiacan about August 1. The passenger service as first will consist of one passenger train daily, each way, between Guaymas and Culiacan, carrying a Pullman sleeper. (June 12, p. 96.)

SPARTA-MELROSE ELECTRIC RAILWAY & POWER CO.—An officer writes that it has not been decided when contracts are to be let for building this line. The projected route is from Sparta, Wis., northwest via Angelo, Trout Fall and Cataract to Melrose, 28 miles. There will be two long bridges, one over Black river. (July 3, p. 457.)

TEXAS ROADS.—Dr. C. F. Simmons, of San Antonio, Tex., announces that work is now under way on a line from a point west of Medina river to Simmons City, in Live Oak county, Tex. He is prepared to put up half the amount necessary to build the line and a committee is now at work raising the remainder of the required amount. (See Texas Roads, R. R. G., Nov. 29, 1907, p. 670.)

THESSALON & NORTHERN.—The Dominion government has granted a subsidy to this company for a line northerly from Thessalon, Ont., not to exceed 4 miles.

WABASH PITTSBURGH TERMINAL.—F. H. Skelding and H. W. McMasters, receivers of the Wabash Pittsburgh Terminal and the West Side Belt, have asked permission to issue $700,720 receivers' certificates for the West Side Belt and $954,201 for the Wabash Pittsburgh Terminal to make improvements in the Pittsburgh district. The petition says that there are 18 trestles on the West Side Belt which are unsafe for passenger traffic. Repairs are to be made to some of these trestles and others replaced with steel structures. A steel bridge over West Carson street and a long retaining wall along the Sawmill Run are also to be built. The Wabash Pittsburgh Terminal has 17 tunnels and all but three are lined with wood. They are unsafe and the receivers propose to line them with stone. Two more sidings are needed.

WASHINGTON & WESTERN MARYLAND.—See Baltimore & Ohio.

WASCO COUNTY ELECTRIC & POWER CO.—Contract said to be let to the Portland Construction Co., Marquam building, Portland, Ore., for building the proposed electric line from Condon, Ore., southwest via Antelope and Madras to Bend, 110 miles, with an eastward branch via Howard to Dayville, 80 miles. Plans are also being made for power stations on the Deschutes and John Day rivers. Construction is to be started soon. G. S. Carpenter, President, of Fossil; R. L. Donaldson, General Manager, and J. C. Stevens, Superintendent, both of Portland.

WESTERN PACIFIC.—The completion of the tunnel under Alameda creek permits track laying toward Oakland, Cal., to be pushed toward completion. It is said that when Oakland has been reached rail laying in California will cease for this year until the other tunnels are completed. The gap between Marysville and Sacramento has been closed, so that the line is continuous for 196 miles from Alameda creek, just west of Niles, to Berrycreek, 20 miles east of Oroville. Regular freight and passenger service is in operation between Marysville and Berrycreek. A mile-long tunnel in Nevada will be completed by October, but the Spring Garden and Beckwith pass tunnels will require nine or ten months more. The engineers believe that the east and west ends of the track will meet at or very near Beckwith pass, which is at the summit of the Sierras. (June 5, p. 47.)

WEST SIDE BELT.—See Wabash Pittsburgh Terminal.

Railroad Financial News.

ATLANTIC & LAKE SUPERIOR.—The property, including equipment, of this road and the Baie des Chaleurs railroad is advertised for sale. The Atlantic & Lake Superior runs from Caplin, Bonaventure county, Que., to Paspebiac, 20 miles. The Baie des Chaleurs road runs from Metapedia, on the Intercolonial, to Caplin, 80 miles.

BALTIMORE, CHESAPEAKE & ATLANTIC.—Holders of preferred stock have begun depositing their stock with the Colonial Trust Co., of Baltimore, preparatory to taking into court the matter of payment of dividends on the preferred stock. They claim that surplus earnings are not used for building up their property or for paying dividends. This company is controlled by the Pennsylvania.

BROOKLYN RAPID TRANSIT.—The Public Service Commission, First District, on July 17 denied the application of the Brooklyn Union Elevated for authority to make a $20,000,000 mortgage and the application of the Nassau Electric for authority to make a $5,000,000 mortgage. (R. R. G., May 24, 1907, p. 728.)

CHESAPEAKE & OHIO.—Kissel, Kinnicutt & Co. and William Salomon & Co. are offering the unsold portion of $2,000,000 first mortgage 4 per cent. bonds of 1904-1944 at 87¾, yielding 4.70 per cent. There are $4,771,000 of these bonds outstanding, of a total authorized issue of $5,000,000.

CHICAGO CONSOLIDATED TRACTION.—In consequence of the default, June 1, in the payment of interest on $6,750,000 4½ per cent. bonds and the appointment of a receiver, a bondholders' protective committee has been formed, composed of W. H. Harrity, Chairman, John B. Parsons, J. Nelson Vance, Benjamin Wolf, Clarence J. Housman, E. A. Cummings, Henry G. Foremann, and Phillip H. Gray, Secretary, 108 Dearborn street, Chicago.

CHICAGO SUBWAY.—The time to consent to the exchange of Illinois Tunnel Co. first mortgage bonds for new first lien 5 per cent. bonds of the Chicago Subway Co. has been extended to August 1. About 95 per cent. of the $17,000,000 Illinois Tunnel bonds outstanding have been deposited.

CINCINNATI, HAMILTON & DAYTON.—July 15 was the last day for exchanging refunding bonds for collateral trust notes. Over 88 per cent. of the outstanding 4 per cent. refunding bonds have been exchanged for collateral trust 4 per cent. notes, due July 1, 1913.

Clarksville Street Railway & Light Co.—H. M. Carson, of Nashville, Tenn., has been appointed Receiver of the Clarksville Street Railway & Light Co., which owns about 5½ miles of electric railway and electric and gas plants in Clarksville, Tenn., and New Providence.

Cleveland, Cincinnati, Chicago & St. Louis.—Moffat & White, New York, are offering the unsold portion of $1,000,000 general mortgage 4 per cent. bonds of 1893-1993, of which $23,986,000 are outstanding, at 94, to yield about 4.25 per cent. The total authorized issue of these bonds is $50,000,000.

Des Moines, Iowa Falls & Northern.—This company's property has been sold to the St. Paul & Des Moines, which is building an extension of the Des Moines, Iowa Falls & Northern from Iowa Falls, Iowa, to Mason City. The purchasing company contracts to pay the Des Moines, Iowa Falls & Northern $902,500 for the line from Des Moines to Iowa Falls, including terminals, etc., and to assume the existing indebtedness of the selling company. The two companies mentioned are owned by the same persons, and the change is made merely to consolidate their finances. In future the consolidated company will be known as the St. Paul & Des Moines, and W. A. Bradford will continue to be President.

Detroit, Toledo & Ironton.—The $1,208,000 collateral trust notes held as security by Rudolph Kleybolte & Co. as collateral for a loan have been sold to H. B. Holland & Co. interests for $100,000.

Fulton Street Railway.—Gilbert H. Montague has been appointed receiver, with authority to resume the operation of the road if it seems best. (June 5, 1908, p. 47.)

Huntington & Broad Top Mountain Railroad & Coal.—No semi-annual dividend on the $2,000,000 non-cumulative preferred stock has been declared. Last January 3½ per cent. was paid. In 1907, 7 per cent. was paid, and in 1906, 7½ per cent. There has been no dividend on the common stock since 1904, when 1 per cent. was paid.

Illinois Tunnel Co.—See Chicago Subway.

International & Great Northern.—A press despatch says that the receiver is to issue $450,000 receiver's certificates to get money to pay for new equipment recently ordered.

Manila Railroad.—Speyer Bros. and the Hong Kong & Shanghai Banking Corporation received subscriptions up to July 7 in London, Eng., for £1,250,000 ($6,250,000) 4 per cent. "A" debenture bonds at 83. The debenture bonds are a charge against the earnings from 208 miles of railroad in operation in the Philippines, and also from 444 miles of new line now under construction.

Michigan United Railways.—The National Provincial Bank of England and Sperling & Co. are, it is said, to offer in London, at 98, $1,000,000 Michigan United Railways first mortgage bonds.

Nashville, Chattanooga & St. Louis.—A semi-annual dividend of 2½ per cent. on the capital stock was declared on July 14, thus reducing the annual rate to 5 per cent. In 1907 6 per cent. was paid, and in the first half of 1908, 3 per cent.

New York City Railway.—William W. Ladd has been appointed receiver of the New York City Railway, effective August 1, succeeding A. H. Joline and Douglas Robinson, who will continue as receivers of the Metropolitan Street Railway.

The Central Park North & East River, formerly operated by the New York City Railway, is now under the management of the stockholders. It now has no equipment of its own, and if the road is to be operated the stockholders will have to acquire new equipment in some way.

The Public Service Commission, First District, approved, on July 15, a new agreement between the Central Crosstown and the Metropolitan Street Railway. (July 10, 1908, p. 500.)

See Fulton Street Railway.

New York, New Haven & Hartford.—Kidder, Peabody & Co., Boston, Mass., have filed a suit with the Supreme Court of Massachusetts to obtain a decision sustaining the validity of the guarantee of the 4 per cent. preferred stock of the New England Investment & Security Co. by the Consolidated Railway, and the liability of the New York, New Haven & Hartford therefor because of its merger with the Consolidated Railway. This is similar to a suit brought by Mackay & Co., of New York, in the Connecticut courts.

Pennsylvania.—See Baltimore, Chesapeake & Atlantic.

St. Joseph Belt Railway.—This company has applied for a charter and proposes to acquire by lease or purchase the railroad of the St. Joseph Stock Yards Co., St. Joseph, Mo. The St. Joseph Belt is capitalized at $500,000, and the incorporators include Stephen S. Brown, Joseph L. Fireland, Louis Siemens, Peter P. Welty, and Louis R. Sack, all of St. Joseph.

St. Paul & Des Moines.—See Des Moines, Iowa Falls & Northern.

South Dakota Central.—E. H. Rollins & Sons, and Woodin, McNear & Moore, Chicago, are offering $300,000 first mortgage 5 per cent. bonds of 1907-1927 at 96, yielding about 5⅜ per cent. These bonds are secured by a first mortgage on 103 miles of line, including equipment, from Sioux Falls, S. D., to Watertown.

Southern Pacific.—This company has arranged to sell through Kuhn, Loeb & Co. $18,000,000 first mortgage and refunding 4 per cent. bonds of the Central Pacific, being the remainder of an authorized issue of $100,000,000. Of the amount already issued ,the public holds $79,242,000, the United States $5,881,000 as security for 3 per cent. notes, and there is in the treasury of the company $14,704,000. The bonds held by the United States are released as the C. P. pays its notes.

The estate of Charles S. Durkee, a former governor of Utah, has brought suit in the United States Circuit Court at San Francisco against the Southern Pacific, the Union Pacific, the Central Pacific, the Central Trust Co., New York; the Farmers' Trust Co., New York, and E. H. Harriman, asking the court to require the defendants to make an accounting and to appoint a receiver for the holdings of the defendants. Gov. Durkee was governor of the territory of Utah in 1865, and it is alleged that while the Union Pacific was under construction he acquired $9,000,000 worth of construction bonds and later took $27,000,000 of the first mortgage bonds, and that no accounting has been made for these bonds. It is also alleged that an effort to defraud him of a just claim was made when the Union Pacific Railway was merged into the Union Pacific Railroad Company.

Underground Electric of London.—The plan for the readjustment of this company's finances has been confirmed by the Chancery Court in London. This plan provides for the issue of various bonds aggregating $46,000,000. (R.R.G., April 24, 1908, p. 592.)

Union Pacific.—See Southern Pacific.

United Railroads of Yucatan.—The Merida & Peto, which is the only independent railroad company in Yucatan, is about to be taken over by the United Railroads of Yucatan. The directors of the latter company have confirmed the purchase of the Merida & Peto for $2,000,000. The United of Yucatan recently borrowed $5,000,000, part of which, according to a press despatch from Mexico City, will be used to make the first payment for the Merida & Peto, which is a line about 96 miles long.

Wheeling & Lake Erie.—Because of the default of interest due July 1, on $2,094,000 5 per cent. equipment bonds of 1922, a bondholders' committee has been formed, composed of the following: F. J. Lisman, Willard V. King, Sidney G. Borg, Evans R. Dick and John T. Howard. William G. Edinburgh, 30 Broad street, New York, is Secretary of the committee. B. A. Worthington, receiver, says: "I desire to advise all holders of such [equipment] obligations that I expect to pay the same. The Circuit Court is on vacation now. On July 30, at Cleveland, Ohio, we shall apply for an order directing the payment of such obligations." It is announced that the $8,000,000 5 per cent. notes maturing August 1, which are secured by $12,000,000 general mortgage 4 per cent. bonds, will be taken care of. No official announcement of the method has been made.